Cover Sheet: Request 12280

New Ph.D. with a major in Anatomical Sciences Education

Info

Process	Degree|New|Grad|Existing Type|State-funded|Residential
Status	Pending at FAC - Faculty Senate Steering Committee
Submitter	Kyle Rarey rarey@ufl.edu
Created	2/6/2018 9:15:14 AM
Updated	9/20/2018 2:19:59 PM
Description of request	The Department of Anatomy & Cell Biology in the College of Medicine and the Schools of Teaching and Learning and Human Development and Organizational Studies in the College of Education are jointly sponsoring the proposed Anatomical Sciences Education Graduate MS and PhD Programs. The proposed online, non-thesis MS program uniquely offers the flexibility of three paths of study that centers on human medical anatomy: (1) education, (2) pre-professional, and (3) biomedical research. The educational path is crafted for teachers in secondary education, anatomy instructors at community colleges, and others seeking post baccalaureate education in the anatomical sciences. The proposed PhD program in human Anatomical Sciences Education is a thesis-based doctoral program designed to train individuals to become fully qualified educators in all of the anatomical disciplines and conduct educational scholarly research for promotion and tenure. It offers a broad range of courses related to medical human gross and microscopic anatomy, anatomical imaging, cell biology, combined with higher education. This program will cover anatomical knowledge, pedagogical expertise, and assessment skills critical for training students for a career in teaching anatomy at the university level and in conducting scholarship in medical education. The proposed doctoral program will be only the second in the United States that is jointly sponsored by the Colleges of Medicine and Education.

Actions

Step	Status	Group	User	Comment	Updated
Department	Approved	MED - Anatomy and Cell Biology 312926000	Yehia Daaka		2/8/2018
No document changes					
College	Approved	MED - College of Medicine	Thomas Rowe		2/8/2018
No document changes					
OIPR	Approved	PV - Office of Institutional Planning and Research	Cathy Lebo		5/15/2018
No document changes					
AP for Academic and Faculty Affairs	Approved	PV - Associate Provost for Academic and Faculty Affairs	Angel Kwolek-Folland		5/15/2018
No document changes					
Graduate Council	Approved	GRAD - Graduate Council	Lorna M Dishman	The proposal was approved at the September 20, 2018 Graduate Council meeting effective Spring 2019, pending further approvals.	9/20/2018
Anatomical Sciences Education Proposal.docx Catalog Copy.docx Course Eval.docx					9/13/2018 9/13/2018 9/13/2018
University Curriculum Committee Notified	Notified	PV - University Curriculum Committee (UCC)			9/20/2018

Step	Status	Group	User	Comment	Updated
No document changes					
Faculty Senate Steering Committee	Pending	FAC - Faculty Senate Steering Committee			9/20/2018
No document changes					
Faculty Senate					
No document changes					
Academic Affairs					
No document changes					
Board of Trustees					
No document changes					
Board of Governors					
No document changes					
Academic Affairs Notified					
No document changes					
Graduate School Notified					
No document changes					
Office of the Registrar					
No document changes					
OIPR Notified					
No document changes					
Academic Assessment Committee Notified					
No document changes					
College Notified					
No document changes					

Board of Governors, State University System of Florida

Request to Offer a New Degree Program
(Please do not revise this proposal format without prior approval from Board staff)

University of Florida **University Submitting Proposal**	**Spring 2019** **Proposed Implementation Term**
College of Medicine **College of Education**	**Department of Anatomy and Cell Biology** **School of Teaching and Learning/School of Human Development and Organizational Studies**
Name of College(s) or School(s)	**Name of Department(s)/ Division(s)**
Anatomical Sciences Education	**Master of Science** **Doctor of Philosophy**
Academic Specialty or Field	**Complete Name of Degree**
26.0403 **Proposed CIP Code**	

The submission of this proposal constitutes a commitment by the university that, if the proposal is approved, the necessary financial resources and the criteria for establishing new programs have been met prior to the initiation of the program.

Date Approved by the University Board of Trustees		**President**	**Date**
Signature of Chair, Board of Trustees	**Date**	**Vice President for Academic Affairs**	**Date**

Provide headcount (HC) and full-time equivalent (FTE) student estimates of majors for Years 1 through 5. HC and FTE estimates should be identical to those in Table 1 in Appendix A. Indicate the program costs for the first and the fifth years of implementation as shown in the appropriate columns in Table 2 in Appendix A. Calculate an Educational and General (E&G) cost per FTE for Years 1 and 5 (Total E&G divided by FTE).

MS Program

Implementation Timeframe	Projected Enrollment (From Table 1)	
	HC	FTE
Year 1	25	25

PhD Program

Implementation Timeframe	Projected Enrollment (From Table 1)	
	HC	FTE
Year 1	2	2

Year 2	50	50
Year 3	50	50
Year 4	50	50
Year 5	50	50

Year 2	4	4
Year 3	6	6
Year 4	8	8
Year 5	10	10

Projected Program Costs for MS and PhD (From Table 2)					
Implementation Timeframe	**E&G Cost per FTE**	**E&G Funds**	**Contract & Grants Funds**	**Auxiliary Funds**	**Total Cost**
Year 1	$14,547	$1,000	0	0	$392,778
Year 5	$15,341	$1,666	0	0	$920,475

The projected costs for both the proposed master's and doctorate programs are based upon the enrollment of students in pre-existing graduate courses offered by the College of Medicine and the College of Education.

Note: This outline and the questions pertaining to each section must be reproduced within the body of the proposal to ensure that all sections have been satisfactorily addressed. Tables 1 through 4 are to be included as Appendix A and not reproduced within the body of the proposals because this often causes errors in the automatic calculations.

INTRODUCTION

I. Program Description and Relationship to System-Level Goals

A. Briefly describe within a few paragraphs the degree program under consideration, including (a) level; (b) emphases, including majors, concentrations, tracks, or specializations; (c) total number of credit hours; and (d) overall purpose, including examples of employment or education opportunities that may be available to program graduates.

Master of Science Program in Anatomical Sciences Education
The proposed online, non-thesis MS program uniquely offers the flexibility of three paths of study that are centered on human medical anatomy: (1) education, (2) pre-professional, and (3) biomedical research. The educational path is crafted for teachers in secondary education, anatomy instructors at community colleges, and others seeking post-baccalaureate education in the anatomical sciences. The pre-professional path is designed for those students that would like to pursue an MD, DMD, DDS, or PA career. Finally, the biomedical path will train, as a first-step, students who are considering the pursuit of a career in medical research.

The proposed 3-path Master of Science program will allow students with different goals to pursue additional training beyond their baccalaureate degree. Teachers in secondary education and at

community colleges can gain more in-depth knowledge of anatomy and learn best practices in teaching and assessing their students. Pre-professional students will be able to gain broad training in all aspects of human anatomy that would allow them to master sufficient base knowledge to pursue health-care professional degrees in medicine, dentistry, physician assistant and physical therapy. Those students that complete the Master of Science program and wish to pursue biomedical research will have completed many of the course requirements for those PhD anatomical programs in biomedical research as well as our PhD Program in Anatomical Sciences Education. Furthermore, students with an MS degree in Anatomical Sciences will be able to teach/assist in human anatomy and histology laboratory exercises.

This program is designed to provide online courses in a synchronous learning format that address anatomical base knowledge including gross anatomy, microscopic anatomy, embryology, and cell biology, and to introduce students to the bases of pedagogy. Furthermore, the program is flexible enough to allow the student to pursue neuroscience, neuroanatomy, and medical physiology courses as electives. The educational path of this MS degree program uniquely blends training in human anatomy with developing pedagogical methods of teaching and assessment.

While there are two Master of Science in Biomedical Sciences programs in the SUS (UCF and USF), the Master of Science program proposed here is distinct because: 1) it offers not one but three paths of post-bac training; 2) the education path is unique in that students can take anatomical and biomedical courses offered by the Department of Anatomy and Cell Biology in the College of Medicine and educational courses in pedagogy and assessment offered by the College of Education as laid out in the catalog copy attachment of this proposal; and 3) the program can reach geographically students throughout the State of Florida, the Southeast Region of the United States, and the world.

PhD Program in Anatomical Sciences Education

The proposed PhD program in human Anatomical Sciences Education is a dissertation-based doctoral program designed to train individuals to become fully qualified educators in all of the anatomical disciplines and conduct educational scholarly research for promotion and tenure**.** It offers a broad range of courses related to medical human gross and microscopic anatomy, anatomical imaging, cell biology, combined with higher education. This program will cover anatomical knowledge, pedagogical expertise, and assessment skills critical for training students for a career in teaching anatomy at the university level and in conducting scholarship in medical education. Students will be mentored to perform and document medical educational research culminating in a dissertation that will be defended in front of a PhD committee composed of faculty from the Colleges of Medicine and Education.

The proposed Ph.D. program in Anatomical Sciences Education is distinctive from SUS 26.999 doctoral programs. The courses offered jointly by the College of Medicine and the College of Education will prepare individuals for competitive positions at higher education colleges and universities. Rather than conducting biomedical bench-based research, individuals in this program will conduct scholarly research in medical education directed by faculty in the Colleges of Medicine and Education.

This PhD program in Anatomical Sciences Education is a unique program in Florida and the Southeast. There are three PhD programs in biomedical sciences in Florida (UF, UCF, and USF), which focus on conventional biomedical research, but not medical educational research. Furthermore, these programs do not address training in education pedagogy, assessment and

scholarship. There are currently four programs in the United States and Canada that offer doctoral programs that include education besides anatomy. These programs are Indiana University, Penn State University, University of Mississippi, and Western University. The curricula of these programs are in Appendix F. Of the four, only Indiana University has input from their College of Education. Our proposed doctoral program will be only the second in the United States that is jointly sponsored by the colleges of medicine and education.

The design of the curriculum for the doctoral program includes required courses in all of the anatomical disciplines: gross anatomy, embryology, histology, and neuroanatomy. In addition, students will be expected to complete other biomedical courses such as cell biology, in order to give students a solid foundational knowledge that helps them understand and teach anatomy, embryology, and histology. This is particularly important because medical schools are moving their curricula to be more integrated and expect faculty to combine material from, say, anatomy and physiology or histology and biochemistry. PhD candidates will take educational research courses and courses focusing on curriculum development and teaching adult learners in the College of Education.

Doctoral students in our program may take classes with other professional students and later in the curriculum could serve as teaching assistants in anatomy and histology courses to pre-professional and professional students. For their dissertation work, students will be able to pursue a broad array of medical education research topics. This will yield a more versatile educational researcher, thereby, giving our students credibility to the broader community of medical education researchers and opening up more avenues for publishing and presenting their work.

Both proposed MS and PhD programs support the University of Florida (UF) and SUS missions by providing premier graduate education programs to individuals with baccalaureate degrees to enter a professional health science program, to enter a biomedical or pharmaceutical research laboratory, or to further their anatomical knowledge and educational training for their roles as science educators in secondary education, community colleges, and health professional (medical, dental, etc.) schools. These programs specifically support the goal of the 2025 System Strategic Plan for the College of Medicine and the University of Florida.

Students for both MS and PhD degrees will be admitted to the Department of Anatomy and Cell Biology at the UF College of Medicine. As such, both MS and PhD degrees will be granted by the UF College of Medicine.

B. Please provide the date when the pre-proposal was presented to CAVP (Council of Academic Vice Presidents) Academic Program Coordination review group. Identify any concerns that the CAVP review group raised with the pre-proposed program and provide a brief narrative explaining how each of these concerns has been or is being addressed.

The MS and PhD pre-proposals were presented to the CAVP in October 2017. The CAVP approved moving forward. The CAVP agreed training competent people to teach anatomy is very difficult and there is a critical need. Members of the CAVP registered no formal concerns, but there were 3 areas of feedback.

1. The CAVP expressed that with 3 tracks and such a small projected enrollment, it looks like the degrees are somewhat over-stretched. Perhaps one way to address this would be to distinguish

between the expected student populations for the MS and the PhD. We anticipate that we'll accept 25 students per year for the Master of Science program. Based on the past enrollment in our current 2 online anatomy certificate programs, the student populations appear bimodal – students seeking to improve their academic records to pursue matriculation into health professional health schools and those individuals who already are teachers in secondary education. The proposed 3-paths masters in anatomical sciences education offers a solid required anatomical and educational core of courses with diversity with related electives.

2. The CAVP expressed that it is not clear what value-added the education piece will provide, i.e., how will the education piece work in terms of the rigor of the program and how will employers see graduates with educational courses rather than science courses? These graduate programs not only provide a means to develop a solid foundation of anatomy but also develop skills in both anatomical teaching and experience in educational scholarship. It recognizes that effective anatomy teaching requires rigorous content as well as pedagogical preparation. For the PhD program, the goal is to develop educators, not just teachers. We want to be a part of reframing expectations of what it means to be an anatomist. As noted by one of the external reviewers for this proposal, there is a growing demand for qualified anatomy educators who can teach all of the anatomical disciplines (cell biology, histology, gross anatomy) and conduct medical education research for promotion and tenure. Furthermore, individuals, who are hired into the Department of Anatomy and Cell Biology at UFCOM to teach, are on a non-tenured research track with the expectation of pursuing scholarly activities. Promotion is based not only on excellence in the classroom but also more importantly on education scholarship. Students in the PhD program will, therefore, understand educational research by completing quantitative and qualitative research methods classes as well as coursework related to adult teaching and learning and curriculum. Note that the College of Education at UF has been ranked for the past two consecutive years (2016, 2017) as America's best online graduate education degree program.

3. The CAVP expressed that a strong case for each of the two degrees in terms of employability and the "fit" between the curriculum and the value of the degree to employers and, hence, graduates, needs to be made.
See our response in Section II. A. Need and Demand.

C. If this is a doctoral level program please include the external consultant's report at the end of the proposal as Appendix D. Please provide a few highlights from the report and describe ways in which the report affected the approval process at the university.

In the summer of 2017, three external reviewers were asked to provide feedback about the pre-proposal of Master of Science and PhD programs. Two reviewers have created similar anatomical sciences education doctoral programs; the other reviewer is Anatomy Department Chairman, as well as the editor of the *Journal of Anatomical Sciences Education*. Their reports are in Appendix D. Members of the Advisory Committee for the Center for Anatomical Sciences Education in the Department of Anatomy and Cell Biology in conjunction with members of the College of Education have reviewed their comments and revised the proposed programs to incorporate the reviewers' feedback to strengthen the proposal.

The overall feedback from external reviewers was that the proposed collaboration by the College of Medicine and the College of Education would be significant and innovative to provide a theoretical and practical-base foundation for training individuals to become highly successful anatomy teachers

via the Master of Science program, and as anatomical educator-scholars via the doctoral program. With the teaching of anatomy to professional students being transformed from a discipline-based format into an integrated curriculum format, faculty members are now needed to be master teachers and educator-scholars, applying evidence-based knowledge about how students best learn to the classroom. Dr. Lehman stated, "The proposed programs will play a key role in supporting this disciplinary change by providing the formative content, skills, and experiences essential to train future generations of educator-scholars in the anatomical sciences. In addition, the collaboration between the Colleges of Medicine and Education in this degree-granting program is novel and forward-thinking, presenting unique opportunities for types of training experiences students can take advantage of, as well as expanding the pool of potential applicants to those with a primary interest and background in education."

Individuals trained in the doctoral program will be highly recruited as noted by Dr. Brokaw, Director of the Indiana University's Anatomical Sciences Education Program, when he stated, "I can attest to the need and growing demand for qualified anatomy educators who can teach all of the anatomical disciplines and conduct medical education research for promotion and tenure. Rarely a week goes by where I don't receive at least one phone call or e-mail from a program somewhere seeking to fill a faculty tenure-track teaching position in anatomy."

The reviewers noted that the success of the programs would depend upon the faculty who can serve as supervisors and research mentors for students and having opportunities for faculty development. With the current anatomy faculty and with our colleagues in the College of Education, we have a critical group to successfully offer and maintain both proposed graduate programs. Future plans for the anatomy department will be to recruit junior anatomy educators when positions become available and provide protected time to junior faculty to develop their own independent line of research in anatomy education, publish and present their work at meetings, and ultimately contribute to the training and supervision of graduate students as suggested by Dr. Lehman. It is believed that the joint interaction with faculty of the College of Education will enhance the teaching and scholarly skills of members of the anatomy teaching faculty.

A reviewer commented on the feasibility of teaching a gross anatomy course via distance learning. Currently, an online gross lecture course and an online laboratory course are offered for our 2 anatomy online certificate programs. The courses are taken world-wide principally by either individuals strengthening their academic record for admittance into professional healthcare institutions or teachers teaching in secondary education or in community colleges that teach anatomy without cadavers. Individuals, wishing to teach in healthcare institutions that rely on cadavers to demonstrate anatomical features, are expected to enroll in our doctoral program in which they will conduct hands-on dissection of a cadaveric body.

We amended the description in our proposal to distinguish between our proposed Master of Science program and our proposed PhD program. While our doctoral program is designed for individuals wishing to become educators-scholars in healthcare professional schools, our Master of Science program is structured to offer different paths for students, including to undergraduates considering the program as a first step to a career in biomedical science research.

Two reviewers commented about support for students, e.g., stipends and funds for travel to meetings. In the Department of Anatomy and Cell Biology, tuition generated from anatomy courses in which the TAs serve as teaching staff will be a source of support. Doctoral students in the Department of Anatomy and Cell Biology and the School of Teaching and Learning will be eligible

for School-level funding for graduate students to present at conferences to support the dissemination of their research.

D. Describe how the proposed program is consistent with the current State University System (SUS) Strategic Planning Goals. Identify which specific goals the program will directly support and which goals the program will indirectly support (see link to the SUS Strategic Plan on the resource page for new program proposal).

The proposed MS and PhD programs in Anatomical Sciences Education will support the goals and objectives of the University's strategic plan and SUS's strategic goals for achieving excellence:

- By attracting students with increasingly diverse demographic and geographic characteristics (Goal 1, Obj. 1) including the metrics of a) racial/ethnic, and b) gender diversity.
- As a diverse, robust educational and interdisciplinary area of excellence (Goal 1, Obj. 3), including the metrics of a) the breadth of educational programs and b) students and faculty engaged in interdisciplinary collaborations.
- Academic programs that promote effective and accessible learning through innovation (Goal 2, Obj. 3), including the metrics of a,) number of UF distance education degrees awarded nationally and internationally, and retention above the national standard, b) number of invitations to present UF educational methods as models, c) number of publications on innovative educational methods, d) intellectual property development in educational methodology and content, and e) certificate program development
- By facilitating high-quality student-faculty interactions in mentored research (Goal 2, Obj. 4), including the metrics of a) number of graduates conducting mentored research, b) number of graduate students' education research presentations at UF, regional, state, national, and international venues
- By promoting educational research and scholarship that enhances fundamental knowledge and improves the lives of the world's citizens (Goal 4, Obj.1), including the metrics of number of publications in influential journals
- By training exceptional graduate and postdoctoral scholars who will contribute to influential research and scholarship (Goal 4, Obj.2), including the metrics of the number of students and postdoctoral scholars conducting educational research, and the number of publications and scholarly works by undergraduate and graduate students and postdoctoral scholars

E. If the program is to be included in a category within the Programs of Strategic Emphasis as described in the SUS Strategic Plan, please indicate the category and the justification for inclusion.

Although our proposed masters and doctoral degree programs are not listed in the SUS Programs of Strategic Emphasis list, the degrees will be fundamental to the development of health educators in Florida and the U.S., and thus will contribute to the strategic emphasis on health (CIP 51) to address the workforce needs for Physician Assistants (51.0912), Dentists (51.0401), and Physicians (51.1201). The programs also contribute to the STEM strategic emphasis for science teachers participating in the master's degree.

F. Identify any established or planned educational sites at which the program is expected to be offered and indicate whether it will be offered only at sites other than the main campus.

The Master of Science program will be offered online in a synchronous learning format. The PhD

program will be offered on the campus of the University of Florida.

INSTITUTIONAL AND STATE LEVEL ACCOUNTABILITY

II. Need and Demand

A. Need: Describe national, state, and/or local data that support the need for more people to be prepared in this program at this level. Reference national, state, and/or local plans or reports that support the need for this program and requests for the proposed program which have emanated from a perceived need by agencies or industries in your service area. Cite any specific need for research and service that the program would fulfill.

There will be an estimated national shortage of approximately 105,000 physicians by 2030 (Source: ttps://news.aamc.org/press-releases/article/enrollment-05252017/). To address this shortage, twenty-two new medical schools have been created and accredited since 2002 to increase the number of graduating physicians as noted by the American Association of Medical Colleges News, May 25, 2017 (ttps://news.aamc.org/press-releases/article/enrollment-05252017/). In addition, new Physician Assistant Schools have been established to increase the number of health-care professionals. In the State of Florida alone, for example, 4 new medical schools have been added to the original three and 11 new accredited physician assistant programs have been established in recent years. The conundrum associated with this national crisis of health-care providers is the increased need for human anatomists who can educate professional healthcare students in the various sub-disciplines of medical anatomy. Traditionally-trained anatomists, who retire or leave the workforce, are not being sufficiently replaced with individuals who have been trained in the medical human anatomy to educate and assess methodologies of teaching and evaluation (Anatomical Science Education 8:258-265, 2015).

The new proposed programs are designed to train new medical anatomists with a solid core of human anatomical knowledge with clinical relevance. Further, these proposed programs will provide the new anatomists with tools to become scholarly educators by being trained in educational research methods. Current advance programs in biomedical sciences are not training individuals about how to teach and assess professional students. There are only 3 schools in the U.S. that prepare students to become anatomical education scholars (Penn State, Indiana University, and University of Mississippi). Of the 3, only Indiana University has a PhD program jointly sponsored by the School of Medicine and College of Education, and the proposed graduate programs in Anatomical Sciences Education at UF will be the 2nd nationally. Our primary goal is to train individuals with expert knowledge of human anatomy, especially clinically-relevant, gross anatomy, expert knowledge in how to teach and assess, and equally important, knowledge of how to conduct scholarly research in the field of medical education. In summary, there are no similar programs in the State of Florida, the Southeast, or in the US as the proposed stand-alone PhD program in Anatomical Sciences Education that will attract American and International students based upon feedback from students enrolled in our established certificate programs and from student inquiries.

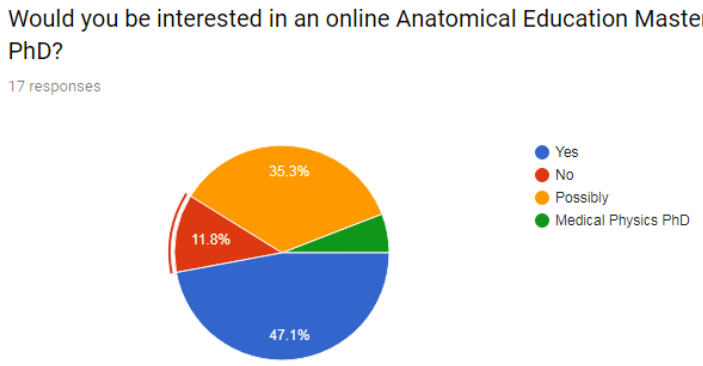
B. Demand: Describe data that support the assumption that students will enroll in the proposed program. Include descriptions of surveys or other communications with prospective students.

There has been a high level of interest in both the proposed Master of Science and PhD programs in

Anatomical Sciences Education due to the national shortage of competent educators to teach in the field of anatomy at the higher levels of education. Two surveys of students enrolled in the Department of Anatomy and Cell Biology's current 2 online certificate programs demonstrate the interest of individuals further enhancing their credentials to teach human anatomy.

The first survey was conducted this past spring of 2017 of students enrolled in UF's Department of Anatomy and Cell Biology online certificate programs (Medical Human Anatomy, Anatomy and Physiology) to identify their current careers. Seven of twelve responding students in the spring survey said they were teachers in secondary education or instructors at community colleges. In the 2nd survey of students in the summer 2017 online courses, six of eleven responding students identified themselves as teachers or instructors, and eight of the eleven expressed great interest in enrolling in an MS in Anatomical Sciences or a doctoral program in Anatomical Sciences Education.

In the second survey of students enrolled in this past fall (2017) online anatomy classes, there were 17 respondents. The enclosed graph illustrated the interest in having the opportunity to pursue advanced degrees in anatomical educational sciences.



C. If substantially similar programs (generally at the four-digit CIP Code or 60 percent similar in core courses), either private or public exist in the state, identify the institution(s) and geographic location(s). Summarize the outcome(s) of communication with such programs with regard to the potential impact on their enrollment and opportunities for possible collaboration (instruction and research). In Appendix C, provide data that support the need for an additional program.

The proposed programs would be unique in the SUS. The proposed MS and PhD programs are distinctively different from the closest MS and PhD programs offered in the SUS in CIP 26.9999 in so far as (1) the proposed programs are specifically in the anatomical sciences; (2) the proposed programs include education courses in pedagogy and assessment skills, and (3) these programs are sponsored jointly by the College of Medicine (Department of Anatomy -Cell Biology) and the College of Education. The MS programs offered by UCF and USF and the PhD programs offered by UCF, USF, and FIU are designed to prepare students to pursue health-related professional careers and/or biomedical research careers. There are 39 students enrolled in MS Biomedical Sciences at the University of Central Florida. There are 30 students enrolled in the Master of Science in Medical Sciences at the University of South Florida. There are 50 students enrolled in the PhD Program in Biomedical Sciences at the University of Central Florida. There are 96 students

enrolled in the Master of Science with a concentration in Anatomy at the University of South Florida.

D. Use Table 1 in Appendix A (1-A for undergraduate and 1-B for graduate) to categorize projected student headcount (HC) and Full-Time Equivalents (FTE) according to primary sources. Generally, undergraduate FTE will be calculated as 30 credit hours per year and graduate FTE will be calculated as 24 credit hours per year. Describe the rationale underlying enrollment projections. If students within the institution are expected to change majors to enroll in the proposed program at its inception, describe the shifts from disciplines that will likely occur.

The headcount for our MS program (n=25) is based upon survey data of students enrolled in our certificate programs and the number of students enrolled in MS programs offered by other SUS institutions.

The headcount for our PhD program (n=2) is based upon requests made to our Anatomy and Cell Biology Department, survey data from individuals enrolled in our certificate programs, and the data shared by Dr. Brokaw, the external reviewer from Indiana University. We do not expect students within UF to change majors to enroll in this program.

E. Indicate what steps will be taken to achieve a diverse student body in this program. If the proposed program substantially duplicates a program at FAMU or FIU, provide, (in consultation with the affected university), an analysis of how the program might have an impact upon that university's ability to attract students of races different from that which is predominant on their campus in the subject program. <u>The university's Equal Opportunity Officer shall review this section of the proposal and then sign and date Appendix B to indicate that the analysis required by this subsection has been completed</u>.

The MS program and PhD program will be broadly marketed by both the College of Medicine and the College of Education through traditional channels (our websites) and social media. The programs will also be marketed via professional organizations, e.g., American Association of Anatomists and American Association of Clinical Anatomists). Every effort will be made to attract minority students by using materials that are inclusive of diverse audiences. The proposed programs do not duplicate programs offered at FAMU or FIU and, therefore, not unfavorably impact minority institutions. The inclusion of an educational research and pedagogical focus may appeal particularly to those students who wish to use their content knowledge and give back to their communities through teaching and service.

III. Budget

A. Use Table 2 in Appendix A to display projected costs and associated funding sources for Year 1 and Year 5 of program operation. Use Table 3 in Appendix A to show how existing Education & General funds will be shifted to support the new program in Year 1. In narrative form, summarize the contents of both tables, identifying the source of both current and new resources to be devoted to the proposed program. (Data for Year 1 and Year 5 reflect snapshots in time rather than cumulative costs.)

For the MS program, students will be enrolled in courses already offered by the College of

Education and by the Department of Anatomy and Cell Biology in the College of Medicine. No need for additional FTE is anticipated.

For the PhD program, students will be enrolled in existing and planned graduate courses in the Department of Anatomy and Cell Biology and the College of Education. It is anticipated that current course enrollment will be able to absorb additional anatomy and education courses. No need for additional FTE is therefore projected at this time. Nonetheless, the teaching assignments of existing faculty will be shifted to reflect the anticipated additional teaching responsibilities.

Tuition allocation between the COM and COEd will be consistent with the normal UF budget processes. For online courses (those associated with the MS degree), we will establish a self-supporting account for tuition deposit through the Office of Distance Education. Dr. Daaka is the Program Director and in this capacity, he will allocate all funds belonging to COEd (based on the number of student credit hours given by COEd) at the end of each semester. For regular courses (those associated with the PhD program), the COM (as the home of students and the degree-granting College) will retain 30% of tuition for all student credit hours taken at COEd. COEd will receive remaining 70% of the tuition.

B. Please explain whether the university intends to operate the program through continuing education, seek approval for market tuition rate, or establish a differentiated graduate-level tuition. Provide a rationale for doing so and a timeline for seeking Board of Governors' approval, if appropriate. Please include the expected rate of tuition that the university plans to charge for this program and use this amount when calculating cost entries in Table 2.

The MS and PhD programs will not be operated through continuing education on a cost-recovery basis, seek approval for market tuition rate, or establish differentiated graduate-level tuition. The expected rate of graduate tuition for both MS and PhD students will be based on the University's standard costs and projected estimates, which is $448.73 per credit hour and fees are $81.96 for a total of $530.69 per credit hour for the 2017-2018 academic year.

C. If other programs will be impacted by a reallocation of resources for the proposed program, identify the impacted programs and provide a justification for reallocating resources. Specifically address the potential negative impacts that implementation of the proposed program will have on related undergraduate programs (i.e., shift in faculty effort, reallocation of instructional resources, reduced enrollment rates, greater use of adjunct faculty and teaching assistants). Explain what steps will be taken to mitigate any such impacts. Also, discuss the potential positive impacts that the proposed program might have on related undergraduate programs (i.e., increased undergraduate research opportunities, improved quality of instruction associated with cutting-edge research, improved labs and library resources).

No impact on undergraduate programs is anticipated. For the COE – because courses are already scheduled to occur, these new programs will enhance enrollment for these courses without replacing any courses or re-assigning faculty.

D. Describe other potential impacts on related programs or departments (e.g., increased need for general education or common prerequisite courses, or increased need for required or elective courses outside of the proposed major).

We expect that our graduate program will have a positive impact on other UF graduate programs. For example, we anticipate benefiting the education graduate programs in the College of Education.

E. Describe what steps have been taken to obtain information regarding resources (financial and in-kind) available outside the institution (businesses, industrial organizations, governmental entities, etc.). Describe the external resources that appear to be available to support the proposed program.

N/A

IV. Projected Benefit of the Program to the University, Local Community, and State

Use information from Tables 1 and 2 in Appendix A, and the supporting narrative for "Need and Demand" to prepare a concise statement that describes the projected benefit to the university, local community, and the state if the program is implemented. The projected benefits can be both quantitative and qualitative in nature, but there needs to be a clear distinction made between the two in the narrative.

Quantitative:

- Increase the ability to attract the most highly qualified graduate students, which provides a direct benefit to the Department of Anatomy and Cell Biology, the COM, and the COE, and the University
- Increase student diversity in terms of students from diverse ethnic and cultural backgrounds
- Increase number of scholarly publications, particularly in high-impact journals.
- Increase research collaboration with other UF departments and colleges, including medicine and education
- Increase the number of scholarly health-care educators, not just health-care teachers
- Increase extramural funding to support educational research

Qualitative:

- Impact the training of health-care providers by developing scholarly trained anatomists
- Development of a "talent pipeline" that must exist to create a multi-disciplinary expertise in anatomy and education to build the knowledge and innovation envisioned by the Florida Board of Governors.

V. Access and Articulation – Bachelor's Degrees Only

A. If the total number of credit hours to earn a degree exceeds 120, provide a justification for an exception to the policy of a 120 maximum and submit a separate request to the Board of Governors for an exception along with notification of the program's approval. (See criteria in Board of Governors Regulation 6C-8.014)

N/A

B. List program prerequisites and provide assurance that they are the same as the approved common prerequisites for other such degree programs within the SUS (see link to the Common Prerequisite Manual on the resource page for new program

proposal). The courses in the Common Prerequisite Counseling Manual are intended to be those that are required of both native and transfer students prior to entrance to the major program, not simply lower-level courses that are required prior to graduation. The common prerequisites and substitute courses are mandatory for all institution programs listed and must be approved by the Articulation Coordinating Committee (ACC). This requirement includes those programs designated as "limited access."

If the proposed prerequisites are not listed in the Manual, provide a rationale for a request for an exception to the policy of common prerequisites. NOTE: Typically, all lower-division courses required for admission into the major will be considered prerequisites. The curriculum can require lower-division courses that are not prerequisites for admission into the major, as long as those courses are built into the curriculum for the upper-level 60 credit hours. If there are already common prerequisites for other degree programs with the same proposed CIP, every effort must be made to utilize the previously approved prerequisites instead of recommending an additional "track" of prerequisites for that CIP. Additional tracks may not be approved by the ACC, thereby holding up the full approval of the degree program. Programs will not be entered into the State University System Inventory until any exceptions to the approved common prerequisites are approved by the ACC.

N/A

C. If the university intends to seek formal Limited Access status for the proposed program, provide a rationale that includes an analysis of diversity issues with respect to such a designation. Explain how the university will ensure that Florida College System transfer students are not disadvantaged by the Limited Access status. NOTE: The policy and criteria for Limited Access are identified in Board of Governors Regulation 6C-8.013. Submit the Limited Access Program Request form along with this document.

N/A

D. If the proposed program is an AS-to-BS capstone, ensure that it adheres to the guidelines approved by the Articulation Coordinating Committee for such programs, as set forth in Rule 6A-10.024 (see link to the Statewide Articulation Manual on the resource page for new program proposal). List the prerequisites, if any, including the specific AS degrees which may transfer into the program.

N/A

INSTITUTIONAL READINESS

VI. Related Institutional Mission and Strength

A. Describe how the goals of the proposed program relate to the institutional mission statement as contained in the SUS Strategic Plan and the University Strategic Plan (see link to the SUS Strategic Plan on the resource page for new program proposal).

https://catalog.ufl.edu/ugrad/current/uf-mission/Pages/home.aspx

The proposed MS and PhD programs in Anatomical Sciences Education will support the UF and SUS's Mission Statements by:

- attracting students of differing ethnicity and gender to help UF create a diverse environment to foster multi-cultural skills and perspectives in its teaching.
- teaching and mentoring students who will contribute and succeed in the 21st century

The proposed MS and PhD programs in Anatomical Sciences Education will support the UF and SUS's Strategic Goals by:

- recruiting exceptional graduate students (2nd UF Goal that is aligned with SUS 2025 Strategic Plan Goals 1,3,4,5,6)
- training and mentoring to enrolled graduate students so they can be successful in healthcare field by being exemplary teachers and scholarly researchers (4th UF Goal that is aligned with SUS 2025 Strategic Plan Goals, 1,3,7,8,9,
- training students how to conduct scholarly research in anatomical education and technology, thereby, increasing scholarly productivity (5th & 6th UF Goals that are aligned with SUS 2025 Strategic Plan Goals 1,4,5,6,7,8,9)
- graduating exceptional, scholarly educators who can impact the training of healthcare professional students (8th UF Goal that is aligned with SUS 2025 Strategic Plan Goals 1,4,5,6,7,8)

B. Describe how the proposed program specifically relates to existing institutional strengths, such as programs of emphasis, other academic programs, and/or institutes and centers.

The proposed program will extend UF's institutional strengths through developing and enhancing collaborations between faculty of the College of Medicine and the College of Education. The MS program is consistent with the overall vision of the UF goals of outreach education in the areas of human anatomical sciences and education. The MS online program will also afford usability to offer education training to a diverse student population worldwide.

C. Provide a narrative of the planning process leading up to submission of this proposal. Include a chronology in table format of the activities, listing both university personnel directly involved and external individuals who participated in planning. Provide a timetable of events necessary for the implementation of the proposed program.

Establishment of Departmental Center for Anatomical Sciences Education (CASE). The overall goals of CASE are to train the next generation of human anatomy educators and scholars (MS and PhD) who are qualified to teach anatomical disciplines to undergraduate, graduate, or professional (medical, dental and physician assistant) students, and produce high-quality educational research. In addition to the traditional areas of study including human gross anatomy, structure laboratory (human cadaver), and human histology and embryology, the planned curriculum includes core courses in cell and systems biology. Also, courses in education and ethics ensure that students conduct their activities with the highest of effectiveness and ethical standards. Importantly, the proposed graduate MS and PhD programs will be offered in collaboration with the College of

Education, the first 2-College collaborative program between the health sciences and general education. The proposed online MS program offers three paths of study: an education track, a pre-professional track, and a biomedical research track. The proposed PhD program is thesis-based and is focused on medical education research and not biomedical research. It is designed to train students for a career in educational scholarship, the first of its kind in the College of Medicine. Students will be mentored to perform and document medical educational research culminating in a thesis that will be defended in front of a PhD committee composed of faculty from the Colleges of Medicine and Education. Notably, both MS and PhD programs support the UF (and SUS) missions by providing premier graduate education opportunities to individuals with baccalaureate degrees to further their training to enter a professional health science program, to gain additional training to enter biomedical research, or to increase their anatomical and educational knowledge for their roles as science educators in secondary education, community colleges, and health professional (medical, dental, etc.) schools. These programs specifically support the goal of the 2025 System Strategic Plan for COM and UF.

Date	Participants	Planning Activity
March 2017	Establishment of Advisory Committee for the Center for Anatomical Sciences Education (CASE)	Discussion graduate programs associated with CASE
April 2017	Members of the Department of Anatomy and Cell Biology and the College of Education	Creating graduate programs jointly sponsored by the College of Medicine and the College of Education
July 2017	Provost's Office	Approval of pre-proposal
October, 2017	External reviewers	Critique pre-proposal design
October, 2017	CAVP	Approval to submit a full proposal

Events Leading to Implementation

Date	Implementation Activity
Spring, 2018	Final COM approval by Dean for full proposal
Spring, 2018	Office of Institutional Planning and Research
Spring, 2018	UF Graduate School review
Spring, 2018	Graduate Council Sub Committee in-depth review
Spring, 2018	Graduate Council approval
Spring, 2018	University Curriculum Committee and Faculty Senate (information item)
Spring, 2018	Faculty Senate review and approval
Fall, 2018	Provost's Office's approval
Fall, 2018	Board of Trustees' approval
Fall, 2018	Submission for consideration, September 2018 by Board of Governors.
Spring 2019	MS and PhD Anatomical Sciences Education Program implementation begins

VII. Program Quality Indicators - Reviews and Accreditation

Identify program reviews, accreditation visits, or internal reviews for any university degree programs related to the proposed program, especially any within the same academic unit. List all recommendations and summarize the institution's progress in implementing the recommendations.

The College of Medicine was fully accredited by the Liaison Committee on Medical Education (LCME) in 2015. The next review is in 2022-2023. The University is accredited through Southern Association of Colleges and Schools Commission on Colleges (SACSCOC), and accreditation was reaffirmed in 2014.

The College of Education just received its full accreditation with no areas of improvement through the Council for the Accreditation of Educator Preparation (CAEP). Programs reviewed this cycle under the new CAEP standards include Agricultural Education, Art Education, Early Childhood Education, Elementary Education (Single and Dual Certification), English Education, Mathematics Education, Music Education, Science Education (Biology, Chemistry, and Physics), Site-Based Implementation of Teacher Education (SITE), and Social Studies Education. Although not explicitly reviewed during this cycle, Educational Leadership, Reading Education, School Counseling and Guidance, School Psychology, Special Education, and other programs that prepare professionals for employment in P-12 settings carry full accreditation through 2024. The College is ranked #1 in Florida and the Southeast and its online programs are ranked #2 nationally in 2017.

VIII. Curriculum

A. Describe the specific expected student learning outcomes associated with the proposed program. If a bachelor's degree program, include a web link to the Academic Learning Compact or include the document itself as an appendix.

SLO #1 Students will learn and apply the acquired knowledge of anatomy, histology, and cell biology to the various tissues and organ systems of the human body.

SLO #2 Students will identify and describe the anatomical features of the human body with reference to systems, location, planes of the body.

SLO #3 Students will identify and describe the functional aspects of the cellular and histological features of the various tissues and organ systems of the human body.

SLO #4 Students will analyze and describe possible pathologic outcomes based on a comparison of anatomy, histology, and cell biology anomalies to normal structure-function relationships.

SLO #5 Students will develop critical thinking skills to assess and integrate how alterations in normal anatomy, histology, and cell biology, including changes in system function, lead to medical conditions.

SLO #6 Students will describe the organogenesis and development of the various organ systems of the human body.

SLO #7 Students will describe the human nervous system and its role in the various systems of the human body.

SLO #8 Students will describe the human physiology and its role in the various systems of the human body.

SL0 #9 Students will design curricula for an anatomy course on-line and on-site.

SL0 #10 Students will develop tools to critically assess anatomical and educational research.

SL0 #11 Students will design and implement an anatomical, educational research study and present/disseminate findings at local, state, and national forums.

SLO #12 Students will describe and compare effective pedagogical strategies in teaching and construct examples of different types of assessments.

SLO #13 Students will design technical tools that will enhance the learning experience of their students.

SLO #14 Students will demonstrate their knowledge of instructional design by creating effective technology-enhanced instruction that includes analysis, design, development, implementation, and evaluation.

SLO #15 Students will demonstrate their mastery of the skills necessary to create effective digital instructional artifacts using a variety of media and methods.

SLO #16 Students will demonstrate the appropriate disposition towards the field of educational technology.

SLO #17 Students will identify and describe general and specific areas of best practices in teaching and learning.

SLO #18 Students will investigate a significant problem or original question within his/her specific field of Science Education.

SLO #19 Students will apply knowledge of science content and pedagogy to complete a written thesis or project and an oral presentation of research that focuses on a significant problem or original question in Science Education.

B. Describe the admission standards and graduation requirements for the program.

Admission Standards:
For both MS program and PhD program, applicants must meet the minimum requirements for the University of Florida Graduate School: Junior/Senior GPA > 3.0 and a score on the Graduate Record Exam (GRE) of 1000 combined verbal and quantitative for the old scale, and a minimum score of 300 for the new scale. The student will submit a minimum of three letters of reference, a statement of purpose, and a resume, which the admissions committee will use to assess the student's qualifications for admission to the program. International students must comply with current UF standards for admission to the Graduate School, including requirements for English language competency and financial responsibility.

Graduation Requirements:
MS Program
The student will complete a total of 32 credit hours for graduation

PhD Program
The student will complete a total of 90+ credit hours for graduation. The degree program will require completion of a dissertation under the direction of the student's supervisory committee and a qualifying and final examination by the supervisory committee. The student will complete written and verbal qualifying examinations and will present and defend a research proposal before the graduate supervisory committee prior to initiating research for the doctoral dissertation. The graduate supervisory committee will assess the written dissertation and will examine the student's overall comprehension and knowledge in a final defense of the dissertation.

C. Describe the curricular framework for the proposed program, including a number of credit hours and composition of required core courses, restricted electives, unrestricted electives, thesis requirements, and dissertation requirements. Identify the total numbers of semester credit hours for the degree.

The online MS program will require 32 post-baccalaureate hours. There are required 11 credit hours of core courses in Anatomy and Cell Biology and 6 credit hours of core courses in Education for a total of 17 hours of core courses. Fifteen credit hours of elective courses will be tailored to the educational, pre-professional, or biomedical research student. Up to 12 credits can be transferred from the Anatomical Sciences Education Certificate program with permission.

Courses (All courses are currently available online)

Required Core Anatomy and Biomedical Courses: 11 credit hours	
GMS 5605: Medical Anatomy	3
GMS 5606L: Medical Anatomy Lab	2
GMS 5630: Medical Histology	3
GMS 5057: Medical Cell Biology	3
Required Core Education & Research Courses: 6 credits	
EME 5207: Designing Technology-Rich Curricula	3
SCE 5140: Science Curriculum Development	3
Elective Courses: 15 credits	
Elective: Anatomy and Biomedical Courses	**(Select at least two)**
GMS 5604: Medical Human Embryology	3
GMS 5613: Medical Human Anatomy by Diagnostic Imaging	2
GMS 6400C: Principles of Physiology	6
GMS 6007: Fundamentals of Neuroscience	2
GMS 6607C: Musculoskeletal Systems	4
GMS 6705: Functional Human Neuroanatomy	4
Elective Education & Research courses:	**(Select at least one)**
SCE 5765: Data-Driven Science Instruction	3
EME 5405: Internet in K-12 Instruction	3
EDF 7486: Methods of Educational Research	3

The PhD program will require a minimum of 90 post-baccalaureate credit hours. Up to 30 credits

may be transferred from an M.S. or other master's program at the discretion of the Program Director and the Graduate School.

Courses

Core Anatomy & Biomedical Courses (Required)	
GMS 5604: Medical Human Embryology	3
GMS 5605: Medical Anatomy	3
GMS 5606L: Medical Anatomy Lab	2
GMS 5613: Medical Human Anatomy by Diagnostic Imaging	2
GMS 5630: Medical Histology	3
GMS 5057: Medical Cell Biology	3
GMS 6607C: Musculoskeletal Systems	4
GMS 6940 Supervised Teaching	3
GMS 6690: Molecular Cell Biology Journal Club	1
Dissertation Research (Required)	
GMS 7979: Advanced Research	
GMS 7980: Research for Doctoral Dissertation	1-15 (S/U)
Anatomy and Biomedical Courses (Elective)	
GMS 6007: Fundamentals of Neuroscience	2
GMS 6400C: Principles of Physiology	6
GMS 6421: Cell Biology	4
GMS 6691: Special Topics in Cell Biology and Anatomy	3
GMS 6705: Functional Human Neuroanatomy	4
Curriculum & Instruction Courses (Required, select 2)	
SCE 5140: Science Curriculum Development	3
EDG 6305: Multiple Perspectives on Teaching and Learning	3
EME 6458: Distance Teaching and Learning	3
EME 6065: Human-Computer Interaction and the Learner	3
EDG 6931: Special Topics: "Teaching Adults"	3
Educational Research Courses (Required, select 2)	
EDG 6931: Special Topics: Survey of Research Methods in STEM Education	3
EDF 6403: Quantitative Foundations of Educational Research	6
EDF 6475: Qualitative Foundations of Educational Research	4
Curriculum & Instruction/Education Research Courses (Electives)	
EDG 7252: Perspectives in Curriculum, Teaching, and Teacher Education	3
EME 6458: Distance Teaching and Learning	3
EME 6059: Blended Learning Environments	3
EDF 6520: History of Education	3
EDF 6544: Philosophical Foundations of Education	3
EDG 6017: Writing for Academic Purposes	3
EDF 6402: Quantitative Foundations in Educational Research: Inferential Statistics	3

EDF 6403: Quantitative Foundations of Educational Research 3
EDF 6402: Quantitative Foundations in Educational Research: Inferential Statistics 3
EDF 6471: Survey Design and Analysis in Educational Research 3
EDF 7412: Structural Equation Models 3
EDF 7474: Multilevel Models 3
EDF 7932: Multivariate Analysis in Educational Research 3
EDF 6475: Qualitative Foundations of Educational Research 4
EDF 7479: Qualitative Data Analysis: Approaches and Techniques 3
EDF 7483: Qualitative Data Collection: Approaches and Techniques 3
EDF 7486: Methods of Educational Research 3

D. Provide a sequenced course of study for all majors, concentrations, or areas of emphasis within the proposed program.

Proposed Plan of Study for MS program:		
Term	**Course**	**Credits**
Fall Year 1	GMS 5605 Medical Anatomy	3
	GMS 5606L Medical Anatomy Lab	2
	Elective	3
Spring Year 1	GMS 5630 Medical Histology	3
	GMS 5057 Medical Cell Biology	3
Summer Year 1	EME 5207 Designing Technology-Rich Curricula	3
	Elective	3
Fall Year 2	SCE 5140 Science Curriculum Development	3
	Elective	3
Spring Year 2	Elective	3
	Elective	3
	Total	32

Proposed Plan of Study for PhD program		
Term	**Course**	**Credits**
Fall Year 1	GMS 5605 Medical Anatomy	3
	GMS 5606L Medical Anatomy Lab	2
	Curriculum & Instruction: Required Course	3
	GMS 6690 Molecular Cell Biology Journal Club	1
Spring Year 1	GMS 5630 Medical Histology	3

	GMS 5057 Medical Cell Biology	3
	Curriculum & Instruction: Required Course	3
	GMS 6690 Molecular Cell Biology Journal Club	1
Summer Year 1	GMS 6607C Musculoskeletal Systems	4
	GMS 7979 Advanced Research	2
Fall Year 2	GMS 5604 Medical Human Embryology	3
	Education Research: Required Course	3-6
	GMS 7979: Advanced Research	0-2
	GMS 6690 Molecular Cell Biology Journal Club	1
Spring Year 2	GMS 5613 Medical Human Anatomy by Diagnostic Imaging	2
	Educational Research: Required Course	3-6
	Anatomy and Biomedical: Elective Course	0-6
	GMS 7979: Advanced Research	0-2
	GMS 6690 Molecular Cell Biology Journal Club	1
Summer Year 2	GMS 6940 Supervised Teaching	3
	GMS 7979 Advanced Research	3
Fall Year 3	C&I / Educational Research: Elective Course	0-3
	Anatomy and Biomedical: Elective Course	0-6
	GMS 6690 Molecular Cell Biology Journal Club	1
	GMS 7980 Research for Doctoral Dissertation	2-5
Spring Year 3	C&I / Educational Research: Elective Course	0-3
	Anatomy and Biomedical: Elective Course	0-6
	GMS 6690 Molecular Cell Biology Journal Club	1
	GMS 7980 Research for Doctoral Dissertation	2-5
Summer Year 3	GMS 6940 Supervised Teaching	3
	GMS 7980 Research for Doctoral Dissertation	6
Fall Year 4	GMS 6940 Anatomy Teaching Practicum	3
	GMS 6690 Molecular Cell Biology Journal Club	5
	GMS 7980 Research for Doctoral Dissertation	1
Spring Year 4	GMS 6940 Supervised Teaching	3
	GMS 6690 Molecular Cell Biology Journal Club	1
	GMS 7980 Research for Doctoral Dissertation	5

Summer Year 4	GMS 7980 Research for Doctoral Dissertation	9
if necessary		
Fall Year 5	GMS 7980 Doctoral Research	9
if necessary		
Spring Year 5	GMS 7980 Doctoral Research	9
if necessary		

E. Provide a one- or two-sentence description of each required or elective course.

Science Courses

GMS 5604: Medical Human Embryology (3 credits)
This online course provides the basis for the development of the organs of human body.

GMS 5605: Medical Anatomy (3 credits)
This online course uses regional and system-based approaches to teach the organization of the anatomy of the human body.

GMS 5606L: Medical Anatomy Lab (2 credits)
This online laboratory course uses images of human dissections to study the anatomy of the human body.

GMS 5613: Medical Human Anatomy by Diagnostic Imaging (2 credits)
This online course is a systematic approach to visualizing by ultrasound, X-ray, MRI, and CAT the organization of the major structures within the human body.

GMS 5630: Medical Histology (3 credits)
This online course is designed to cover the histology of tissues and organs through lectures and chat sessions.

GMS 5057: Medical Cell Biology (3 credits)
Focus on the basics of cellular structure and function in the context of human health and disease.

GMS 6421: Cell Biology (4 credits)
This course will examine the most recent advances in cell biology by lecture and small group discussions of current publications from high impact cell biology journals.

GMS 6691: Special Topics in Cell Biology and Anatomy (3 credits)
This onsite course will examine the deficiencies and abnormalities of the cell that occur in various diseased conditions.

GMS 6400C: Principles of Physiology (6 credits)
This course teaches the functions of the human body at a level required for clinical medicine. This

course covers normal physiology, as well as selected diseases. The ultimate goal is for students to develop an understanding of the integrated functions of the normal body and 'problem solving' and 'critical thinking' skills in evaluating clinical situations.

GMS 6007: Fundamentals of Neuroscience (2 credits)
This course covers the basic background required to understand current topics in the field of Neuroscience, a rapidly changing area that impacts several fields of medicine including public health, public policy, and sports medicine, as well as on the military and pharmaceutical industry.

GMS 6705: Functional Human Neuroanatomy (4 credits)
This is a survey course in functional neuroscience, intended for a diverse group of graduate students. The course integrates basic neuroanatomy with systems neuroscience and cognitive neuroscience through lectures, lab work, textbook and lab atlas, and websites.

GMS 6607C: Musculoskeletal Systems (4 credits)
This course includes laboratory dissections to explore the anatomical features of the human body.

GMS 6690: Molecular Cell Biology Journal club (1 credit)
The students will read and present to the class findings of recent articles in medical education.

GMS 6940: Supervised Teaching (3 credits)
This onsite course is currently being designed for the PhD program. The student will assist in the all aspects of instruction and assessment in Gross Anatomy, Histology, or Cell Biology.

GMS 7979: Advanced Research (1-6 credits)
This course of independent research will be taken prior to the doctoral qualifying exam. The student will have picked a mentor and a committee to guide this research.

GMS 7980: Research for Doctoral Dissertation (3-9 credits)
Upon completion of the qualifying doctoral exam, the student will continue their mentored doctoral research project under this course.

Education & Research Courses

EDG 6356: Teaching, Learning, and Assessment (3 credits)
Historical and in-depth exploration of assessment practices related to curricular issues.

SCE 5140: Science Curriculum Development (3 credits)
Allows teachers to explore science curriculum development from theoretical and practical perspectives. Focuses on reform-based science curriculum and the research and science-specific pedagogical themes underlying their development.

SCE 5765: Data-Driven Science Instruction (3 credits)
Focusing on assessment of science instruction and learning. The course will include the study of research-based approaches to assessment, learning, and teaching.

EME 5207: Designing Technology-Rich Curricula (3 credits)
Extensive work in curriculum development utilizing instructional technologies. Contrasting views of curriculum development.

EME 5405: Internet in K-12 Instruction (3 credits)
Preparing preservice teachers, in-service teachers, and teacher educators to use the Internet.

EDG 6305: Multiple Perspectives on Teaching and Learning (3 credits)
Graduate seminar designed to provide a survey of major theoretical perspectives on learning and instruction, including classical and contemporary theories as well as emerging views.

EME 6065: Human-Computer Interaction and the Learner (3 credits)
Students will explore the interface between pedagogy, educational technology, cognitive science, graphic design, and software engineering, and define effective human-computer interaction.

EME 6458: Distance Teaching and Learning (3 credits)
This course explores forms of synchronous and synchronous interactive distance education from perspectives of theory and practice.

EME 6609: Instructional Design (3 credits)
Focuses on the application of instructional design principles to the development of instruction.

EDG 6931: Special Topics: "Teaching Adults" (3 credits)
The purpose of the course is to explore theory and practice related to teaching adult learners

EDF 6520: History of Education (3 credits)
Salient issues in education from the Reformation to the present.

EDF 6544: Philosophical Foundations of Education (3 credits)
Philosophical bases for democracy and education.

EDG 6017: Writing for Academic Purposes (3 credits)
This seminar is designed to enhance the capacity of advanced graduate students from all academic disciplines to write for academic purposes. It guides students through key rhetorical moves in academic writing --- working with what "they say", presenting what "I say", creating discursive flow, and editing/revising.

EDG 6931: Special Topics: Survey of Research Methods in STEM Education (3 credits)
Focusing on mixed method and designbased research, this advanced course is intended to develop an understanding of the foci and research methods used in STEM education.

EDG 7252: Perspectives in Curriculum, Teaching, and Teacher Education (3 credits)
This course involves a collaborative exploration of enduring issues related to curriculum and its impact on teaching and learning in classrooms at all levels.

EDF 6402: Quantitative Foundations in Educational Research: Inferential Statistics (3 credits)
Analysis of variance: One-way ANOVA, two-way ANOVA, ANOVA, repeated measures, and split plot.

EDF 6403: Quantitative Foundations of Educational Research (6 credits)
Integrated coverage of fundamentals in the general field of education research. Includes statistics, experimental design, and data processing.

EDF 6471: Survey Design and Analysis in Educational Research (3 credits)
Development and analysis techniques for surveys and questionnaires. Techniques of protocol development, data collection, analysis, and reporting.

EDF 7412: Structural Equation Models (3 credits)
Confirmatory factor analysis and causal models**.**

EDF 7474: Multilevel Models (3 credits)
Models and methods for analysis of multilevel data.

EDF 7932: Multivariate Analysis in Educational Research (3 credits)
Review of selected studies, focusing on methods of data analysis. Emphasis on using multivariate techniques.

EDF 6475: Qualitative Foundations of Educational Research (4 credits)
Introduction to philosophical, historical, sociological, and other methodologies as aspects of qualitative educational research.

EDF 7479: Qualitative Data Analysis: Approaches and Techniques (3 credits)
Theories, approaches, and techniques of qualitative data analysis.

EDF 7483: Qualitative Data Collection: Approaches and Techniques (3 credits)
This course on qualitative data collection addresses both theoretical and practical dimensions of conducting qualitative research.

EDF 7486: Methods of Educational Research (3 credits)
Examination of research methodologies. Problem identification as well as organization and presentation of data.

EME 6059: Blended Learning Environments (3 credits)

F. For degree programs in the science and technology disciplines, discuss how industry-driven competencies were identified and incorporated into the curriculum and indicate whether any industry advisory council exists to provide input for curriculum development and student assessment.

Curriculum development and student assessment are driven by the Liaison Committee on Medical Education (LCME).

G. For all programs, list the specialized accreditation agencies and learned societies that would be concerned with the proposed program. Will the university seek accreditation for the program if it is available? If not, why? Provide a brief timeline for seeking accreditation, if appropriate.

The graduate programs (both MS and PhD) in the School of Medicine were fully accredited by the LCME (Liaison Committee on Medical Education) in 2015. The University is accredited through SACSCOC (Southern Association of Colleges and Schools Commission on Colleges), and accreditation was reaffirmed in 2014, and the next full review will take place in 2024, with the fifth-year interim report due in 2019.

H. For doctoral programs, list the accreditation agencies and learned societies that would be concerned with corresponding bachelor's or master's programs associated with the proposed program. Are the programs accredited? If not, why?

Doctoral programs are reviewed and accredited through SACS (Southern Association of Colleges and Schools).

I. Briefly describe the anticipated delivery system for the proposed program (e.g., traditional delivery on the main campus; traditional delivery at branch campuses or centers; or nontraditional delivery such as distance or distributed learning, self-paced instruction, or external degree programs). If the proposed delivery system will require specialized services or greater than normal financial support, include projected costs in Table 2 in Appendix A. Provide a narrative describing the feasibility of delivering the proposed program through collaboration with other universities, both public and private. Cite specific queries made of other institutions with respect to shared courses, distance/distributed learning technologies and joint-use facilities for research or internships.

Courses for the MS Program will be delivered online.
Courses for the PhD Program will be delivered on-site.

IX. Faculty Participation

A. Use Table 4 in Appendix A to identify existing and anticipated full-time (not visiting or adjunct) faculty who will participate in the proposed program through Year 5. Include (a) faculty code associated with the source of funding for the position; (b) name; (c) highest degree held; (d) academic discipline or specialization; (e) contract status (tenure, tenure-earning, or multi-year annual [MYA]); (f) contract length in months; and (g) percent of annual effort that will be directed toward the proposed program (instruction, advising, supervising internships and practica, and supervising thesis or dissertation hours).

Table 4 includes the existing full-time faculty who will participate in both graduate programs. Faculty members in the Department of Anatomy and Cell Biology have 12-month appointments. No additional faculty either in the Department of Anatomy or in the College of Education are planned. Students enrolled in courses of both programs will be integrated for the foreseeable future with other enrolled students (for example, graduate students in the Graduate Program in Biomedical Sciences at the UF COM).

B. Use Table 2 in Appendix A to display the costs and associated funding resources for existing and anticipated full-time faculty (as identified in Table 4 in Appendix A). Costs for visiting and adjunct faculty should be included in the category of Other Personnel Services (OPS). Provide a narrative summarizing projected costs and funding sources.

As listed in Table 2, the primary costs of the MS and PhD programs are faculty and staff salaries and benefits. The reallocated E&G is calculated based upon the percentage effort of faculty and staff salaries/benefits. For year 5, calculations were made based on current salaries and the assumption of

a 3% annual increase in both salary and benefits.

C. Provide in the appendices the abbreviated curriculum vitae (CV) for each existing faculty member (do not include information for visiting or adjunct faculty).

See Appendix C

D. Provide evidence that the academic unit(s) associated with this new degree have been productive in teaching, research, and service. Such evidence may include trends over time for average course load, FTE productivity, student HC in major or service courses, degrees granted, external funding attracted, as well as qualitative indicators of excellence.

Faculty in the Department of Anatomy and Cell Biology are active in research, education and local/national service. Faculty research is directed towards the discovery and understanding of cellular and molecular mechanisms that underlie biologic and disease processes. Our research endeavors are consistent with COM and UF programmatic initiatives that aim to strengthen research in cancer and cell biology. Faculty members use state-of-the-art structural biology, genomics, imaging, signal transduction and cellular biological tools and approaches. The common thread connecting all research is the goal to unlock the mysteries of physiologic and pathologic processes at the molecular and cellular levels. Research productivity of our faculty has been outstanding and is evidenced by publishing in top-tier journals, including Cell, Nature, Science, and Proceedings of the National Academy of Sciences USA. Faculty members also serve as editors, co-editors and on editorial boards for professional journals. As another measure of our faculty expertise and professional stature, many serve on national and international decision-making committees including grant reviews for the National Institutes of Health, National Science Foundation and Department of Defense. Importantly, research activities of the faculty are commonly conducted by students (undergraduate and graduate), reinforcing the faculty commitment to student education and training.

For many years now, the Department of Anatomy and Cell Biology has hosted the PhD-granting Molecular and Cellular Biology (MCB) concentration within the Graduate Program in Biomedical Sciences at the UF COM. Over the past ten years, faculty in the MCB have successfully chaired/directed 59 PhD theses, with an additional 13 in progress. In addition, our faculty regularly serve as members of thesis committees for graduate students in other concentrations within the Graduate Program in Biomedical Sciences at the UF COM as well as in other Colleges at UF. One institutional priority is to increase online distance learning programs, and our faculty continues to lead COM in this area. We presently have three successful online certificate programs focused on human anatomy education, and to date, we have enrolled a total of 338 students and 35 have successfully graduated. Hence, our faculty has the expertise and track record for excellence in graduate student mentoring and training.

Our faculty members are well-accomplished in their education and teaching missions of professional students. For example, the faculty excellence in teaching gross anatomy to medical, dental and physician-assistant students is illustrated by our medical and dental students scoring best on anatomy (among all subspecialties) of Step-1 national exams. Moreover, our faculty regularly receive the prestigious COM Exemplary Teacher awards, with an average of 6 awards per year. Our faculty also direct medical/ graduate student courses and serve on many education-centered University and COM committees that include Graduate Education, Graduate Student Admission, Curriculum, and Academic Status committees.

Lastly and to help facilitate our efforts in establishing graduate programs in human anatomy education, we have established the Center for Anatomical Sciences Education (CASE). The overarching goals of CASE are to train the next generation of human anatomy educators and scholars (MS and PhD) who are qualified to teach anatomical disciplines to undergraduate, graduate, or professional (medical, dental and physician assistant) students, and produce high-quality educational research. In addition to the traditional areas of study including human gross anatomy, structure laboratory (human cadaver), and human histology and embryology, the planned curriculum includes core courses in cell and systems biology. Also, courses in education and ethics ensure that students conduct their activities with the highest of effectiveness and ethical standards. Importantly, the proposed graduate MS and PhD programs will be offered in collaboration with the College of Education, the first 2-College collaborative program of its kind at UF. The proposed online MS program with an on-site capstone offers three tracks of study: an education track, a pre-professional track, and a biomedical research track. The proposed PhD program is thesis-based and is focused on medical education research and not biomedical research. It is designed to train students for a career in educational scholarship, the first of its kind in the College. Students will be mentored to perform and document medical educational research culminating in a thesis that will be defended in front of a PhD committee composed of faculty from the Colleges of Medicine and Education. Notably, both MS and PhD programs support the UF (and SUS) missions by providing premier graduate education opportunities to individuals with baccalaureate degree to further their training to enter a professional health science program, to gain additional training to enter biomedical research, or to increase their anatomical and educational knowledge for their roles as science educators in secondary education, community colleges, and health professional (medical, dental, etc.) schools. These programs specifically support the goal of the 2025 System Strategic Plan for COM and UF.

X. Non-Faculty Resources

A. Describe library resources currently available to implement and/or sustain the proposed program through Year 5. Provide the total number of volumes and serials available in this discipline and related fields. List major journals that are available to the university's students. Include a signed statement from the Library Director that this subsection and subsection B have been reviewed and approved.

The George A. Smathers Libraries, composed of seven libraries, constitutes the largest information resource in the state of Florida. It contains more than 5 million print volumes, one million electronic books, over 170,000 full-text electronic journals, a thousand electronic databases and over 43,000 UF theses and dissertations. In addition, the libraries provide over 425,000 links to online resources, including e-books, databases, government documents, and the full text of journals. Off-site users may access electronic resources by installing Virtual Private Network client software from https://vpn.ufl.edu or by logging into the proxy server at http://www.uflib.ufl.edu/ufproxy.html.The UF Digital Collections contains more than 300 outstanding digital collections, including over 12 million from rare books, theses and dissertations, manuscripts, newspapers, data sets, photographs and oral histories. The Digital Library Center serves as a stable repository for student and faculty publications and presentations.

The HSC Libraries' collection includes reference materials, journals, books, conference proceedings, audiovisuals and electronic resources. As of June 30, 2017 the Libraries' collection totaled 292,213 volumes available for immediate access or housed in a remote storage facility. We have 147,105 unique monograph volumes (books) in all formats and 15,503 serial titles (journals) in all

formats. Our users have access to 355 databases. Total expenditures for the collection in FY16-17 was $2,929,100.

Examples of journals available via the UF libraries that relate to the new degree programs include:

Advances in anatomic pathology
Advances in anatomy embryology and cell biology
Ageing Research Reviews
Aging cell
American journal of human biology
American journal of physical anthropology
American journal of respiratory cell and molecular biology
American journal of surgical pathology
Anatomia histologia embryologia
Anatomic record: Part A, advances in integrative anatomy and evolutional biology
Anatomic science international
Anatomical sciences education
Annals of anatomy-Anatomischer anzeiger
Annual review of cell and developmental biology
Applied immunohistochemistry & molecular morphology
Autophagy
Brain structure & function
Cell
Cell adhesion & migration
Cell death and differentiation
Cell death & disease
Cell division
Cell metabolism
Cell proliferation
Cell research
Cell stem cell
Cells tissues organs
Cellular and molecular life sciences
Cellular microbiology
Clinical anatomy
Clinical dysmorphology
Comparative clinical pathology
Cryo-letters
Current opinion in cell biology
Current opinion in structural biology
Developmental cell
Differentiation
EMBO journal
European journal of cell biology
Experimental cell research

FASEB journal
Frontiers in neuroanatomy
Genes & development
Human brain mapping
Immunology and cell biology
International journal of morphology
Journal of anatomy
Journal of cell biology
Journal of cell science
Journal of cellular physiology
Journal of molecular cell biology
Journal of morphology
Microscopy research & technique
Molecular and cell biology
Molecular cell
Nature cell biology
Nature reviews molecular cell biology
Nature structural & molecular biology
Plant Cell
Protein & cell
Revista Argentina de anatomia clinica
Revista Argentina de anatomia online
Science translational medicine
Seminars in cell & developmental biology
Skeletal muscle
Stem cell research & therapy
Stem cells
Structure
Surgical and radiologic anatomy
Tissue & cell
Trends in cell biology
Zoomorphology

The HSC Libraries include two facilities – the main library on the Gainesville campus and the Borland Health Sciences Library on the Jacksonville campus. They are affiliated with the College of Veterinary Medicine Education Center and the Health Science Center Archives. The main HSC Library in Gainesville, founded in 1956 along with the College of Medicine, is a 48,454 square foot technology-enhanced facility whose users may access 160 publicly available computers on all three floors of the Library, including 26 big screen monitors. Free wireless access is available throughout the library, and patrons not affiliated with UF may request temporary access. The library provides seating and study space for a total of 872 patrons on three floors, including 95 seats in 32 study rooms (18 individual and 14 small group study). The Gainesville Library is open an average of 97 hours per week and averages over 33,000 visitors per month. 24/7 access to the second floor is available to HSC students who complete a registration form. Reference assistance and search help are provided at the Information Desk.

The Health Science Center Libraries provide bibliographic, statistical and 3-D printing and scanning software. Bibliographic software available on HSCL computers includes RefWorks, EndNote desktop (in our instruction lab only), Mendeley and EndNote Web (through our subscription to the Web of Knowledge databases). Several computer workstations within the library provide SAS and SPSS, full Adobe CS5 Suite and Acrobat X Professional software. Certain computer stations on our first floor provide access to anatomy software The VH Dissector by Touch of Life Technologies and our subscription to Anatomy TV: 3d Head & Neck Anatomy (for Dentistry) software is available online to UF students, faculty and staff even off-campus through our proxy server and VPN software. Our two conference rooms include R and Stata statistical software packages as well as Rhinoceros 3-D computer graphics and design and Google SketchUp 3-D modeling software. HSCL offers 2-D scanners on each of its three floors and two 3-D printers and a 3-D scanner on the first floor.

Library services include reference assistance, course-integrated library instruction, circulation, document delivery, interlibrary loan, photocopy services, electronic and print course reserves, lockers and study rooms. Computer access to electronic databases, journals, and catalogs is available both onsite and remotely to authorized users. Since 1999, the HSC Libraries have operated a Liaison Librarian program that assigns one or more dedicated librarians to each HSC College or Department to facilitate the work of academic faculty, researchers, clinicians, and students.

B. Describe additional library resources that are needed to implement and/or sustain the program through Year 5. Include the projected costs of additional library resources in Table 2 in Appendix A. Please include the signature of the Library Director in Appendix B.

While current library collections, staff and facilities are adequate to support the proposed program, the Libraries do not have the resources to add additional new hard-copy journals and other collections and/or technology and services that may be required in the future.

C. Describe classroom, teaching laboratory, research laboratory, office, and other types of space that are necessary and currently available to implement the proposed program through Year 5.

The Department of Anatomy and Cell Biology is housed on the first floor of the Basic Science Building, with offices also in the Dental Science Building and the Cancer and Genetics Research Complex. The first floor of the Basic Science Building is made up of faculty and staff offices and open lab space. The Dental Science second floor has 6 faculty offices making up 681 square feet. In the Cancer and Genetics Research Complex, the department has a faculty office on the second floor and lab space, three faculty offices on the third floor and lab space, and one faculty office on the fourth floor. Faculty offices make up 625 square feet and lab space makes up 3134 square feet. There is no need for specially equipped classrooms for instruction for this program. Non-special-use classroom space is centrally managed at the University of Florida.

D. Describe additional classroom, teaching laboratory, research laboratory, office, and other space needed to implement and/or maintain the proposed program through Year 5. Include any projected Instruction and Research (I&R) costs of additional space in Table 2 in Appendix A. Do not include costs for new construction because that information should be provided in response to X (E) below.

No additional space is needed to offer the MS in Anatomical Education Sciences since all courses will be online.

We project a total enrollment of 10 doctoral students by Year 5 of in the PhD Anatomical Education Sciences program. We anticipate that we will be able to provide sufficient office space by utilizing our existing assigned graduate student offices combined with repurposing some of our open office suite areas into cubicles. Our requirements for classroom space are currently met and we do not anticipate additional needs that would place a burden on the University at this time. We are not requesting specialized teaching or laboratory research space.

E. If a new capital expenditure for instructional or research space is required, indicate where this item appears on the university's fixed capital outlay priority list. Table 2 in Appendix A includes only Instruction and Research (I&R) costs. If non-I&R costs, such as indirect costs affecting libraries and student services, are expected to increase as a result of the program, describe and estimate those expenses in narrative form below. It is expected that high enrollment programs, in particular, would necessitate increased costs in non-I&R activities.

No new capital expenditures are required.

F. Describe specialized equipment that is currently available to implement the proposed program through Year 5. Focus primarily on instructional and research requirements.

The only equipment provided to graduate students at this time consists of computers and software. We have a sufficient number of fully equipped computer stations for doctoral students to use. Importantly, we have expert IT personnel who will help in all students' computer needs.

G. Describe additional specialized equipment that will be needed to implement and/or sustain the proposed program through Year 5. Include projected costs of additional equipment in Table 2 in Appendix A.

No additional specialized equipment will be needed to implement the program.

H. Describe any additional special categories of resources needed to implement the program through Year 5 (access to proprietary research facilities, specialized services, extended travel, etc.). Include the projected costs of special resources in Table 2 in Appendix A.

None

I. Describe fellowships, scholarships, and graduate assistantships to be allocated to the proposed program through Year 5. Include the projected costs in Table 2 in Appendix A.

MS students will be charged tuition and fees. The expectation is there should be a positive budgetary outcome that will help constant update and improvement to the program.

PhD students will be supported through SGR/COM and the Department of Anatomy and Cell

Biology (ACB). The source of ACB monies for years' 2-5 students will be awarded via teaching assistantships for teaching professional students. ACB general funds may be utilized for year 1 students

J. Describe currently available sites for internship and practicum experiences, if appropriate to the program. Describe plans to seek additional sites in Years 1 through 5.

All coursework for the Master of Science program will be online. All coursework for the PhD program will occur on the campus of the University of Florida.

APPENDICES

Appendix A: Projected Headcount and Costs
Appendix B: Equal Opportunity Officer/Library Director
Appendix C: Abbreviated Curriculum Vitae of Participating Faculty

College of Medicine	**College of Education**
Daaka, Yehia	De Jong, Ester
Rarey, Kyle	Dawson, Kara
Dunn, William	Pringle, Rose
Nonabur, Venkatesh	Adams, Alyson
Maxey, Amanda	
Jackson, Moira	
Narayan, Satya	
Aris, John	

Appendix D: Synopses of External Reviewers
Appendix E: Data of Graduate Program within SUS
Appendix F: Data of 4 Programs in the United States and Canada with anatomy and education
Appendix G: Curriculum of 4 Programs in the United States and Canada
Appendix H: Western OntarioOutcomes/Employment of Graduate Students for Past 5 Years

APPENDIX A

APPENDIX A

TABLE 1-A
PROJECTED HEADCOUNT FROM POTENTIAL SOURCES
(Baccalaureate Degree Program)

Source of Students (Non-duplicated headcount in any given year)*	Year 1		Year 2		Year 3		Year 4		Year 5	
	HC	FTE	HC	FTE	HC	FTE	HC	FTE	HC	FTE
Upper-level students who are transferring from other majors within the university**	0	0	0	0	0	0	0	0	0	0
Students who initially entered the university as FTIC students and who are progressing from the lower to the upper level***	0	0	0	0	0	0	0	0	0	0
Florida College System transfers to the upper level***	0	0	0	0	0	0	0	0	0	0
Transfers to the upper level from other Florida colleges and universities***	0	0	0	0	0	0	0	0	0	0
Transfers from out of state colleges and universities***	0	0	0	0	0	0	0	0	0	0
Other (Explain)***	0	0	0	0	0	0	0	0	0	0
Totals	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

* List projected annual headcount of students enrolled in the degree program. List projected yearly cumulative ENROLLMENTS instead of admissions.

** If numbers appear in this category, they should go DOWN in later years.

*** Do not include individuals counted in any PRIOR CATEGORY in a given COLUMN.

APPENDIX A

TABLE 1-B

PROJECTED HEADCOUNT FROM POTENTIAL SOURCES

(MS Graduate Degree Program)

Source of Students (Non-duplicated headcount in any given year)*	Year 1		Year 2		Year 3		Year 4		Year 5	
	HC	FTE	HC	FTE	HC	FTE	HC	FTE	HC	FTE
Individuals drawn from agencies/industries in your service area (e.g., older returning students)	0	0	0	0	0	0	0	0	0	0
Students who transfer from other graduate programs within the university**	0	0	0	0	0	0	0	0	0	0
Individuals who have recently graduated from preceding degree programs at this university	5	5	5	5	5	5	5	5	5	5
Individuals who graduated from preceding degree programs at other Florida public universities	5	5	5	5	5	5	5	5	5	5
Individuals who graduated from preceding degree programs at non-public Florida institutions	5	5	5	5	5	5	5	5	5	5
Additional in-state residents***	0	0	0	0	0	0	0	0	0	0
Additional out-of-state residents***	10	10	10	10	10	10	10	10	10	10
Additional foreign residents***	0	0	0	0	0	0	0	0	0	0
Other (Explain)***	0	0	0	0	0	0	0	0	0	0
Totals	**25**	**25**	**25**	**25**	**25**	**25**	**25**	**25**	**25**	**25**

* List projected annual headcount of students enrolled in the degree program. List projected yearly cumulative ENROLLMENTS instead of admissions.

** If numbers appear in this category, they should go DOWN in later years.

*** Do not include individuals counted in any PRIOR category in a given COLUMN.

TABLE 1-B
PROJECTED HEADCOUNT FROM POTENTIAL SOURCES
(PhD Graduate Degree Program)

Source of Students (Non-duplicated headcount in any given year)*	Year 1		Year 2		Year 3		Year 4		Year 5	
	HC	FTE	HC	FTE	HC	FTE	HC	FTE	HC	FTE
Individuals drawn from agencies/industries in your service area (e.g., older returning students)	0	0	0	0	0	0	0	0	0	0
Students who transfer from other graduate programs within the university**	0	0	0	0	0	0	0	0	0	0
Individuals who have recently graduated from preceding degree programs at this university	1	1	2	2	2	2	2	2	2	2
Individuals who graduated from preceding degree programs at other Florida public universities	0	0	0	0	0	0	0	0	0	0
Individuals who graduated from preceding degree programs at non-public Florida institutions	0	0	0	0	0	0	0	0	0	0
Additional in-state residents***	0	0	0	0	0	0	0	0	0	0
Additional out-of-state residents***	1	1	0	0	0	0	0	0	0	0
Additional foreign residents***	0	0	0	0	0	0	0	0	0	0
Other (Explain)***	0	0	0	0	0	0	0	0	0	0
Totals	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**

APPENDIX A

TABLE 2

PROJECTED COSTS AND FUNDING SOURCES

Instruction & Research Costs (non-cumulative)	Year 1								Year 5						
	Funding Source								Funding Source						
	Reallocated Base* (E&G)	Enrollment Growth (E&G)	New Recurring (E&G)	New Non-Recurring (E&G)	Contracts & Grants (C&G)	Philanthropy Endowments	Enterprise Auxiliary Funds	**Subtotal coulumns 1+...+7**	Continuing Base** (E&G)	New Enrollment Growth (E&G)	Other*** (E&G)	Contracts & Grants (C&G)	Philanthropy Endowments	Enterprise Auxiliary Funds	**Subtotal coulumns 9+...+ 14**
Columns	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Faculty Salaries and Benefits-COM	285,794	0	0	0	0	0	0	**$285,794**	403,805	0	0	0	0	0	**$403,805**
Faculty Salaries and Benefits-COEd	50,010	0	0	0	0	0	0	**$50,010**	75,016	0	0	0	0	0	**$75,016**
A & P Salaries and Benefits	0	0	0	0	0	0	0	**$0**	0	0	0	0	0	0	**$0**
USPS Salaries and Benefits	0	0	0	0	0	0	0	**$0**	0	0	0	0	0	0	**$0**
Other Personal Services	0	0	0	0	0	0	0	**$0**	0	0	0	0	0	0	**$0**
Assistantships & Fellowships	56,975	0	0	0	0	0	0	**$56,975**	441,654	0	0	0	0	0	**$441,654**
Library	0	0	0	0	0	0	0	**$0**	0	0	0	0	0	0	**$0**
Expenses	0	0	0	0	0	0	0	**$0**	0	0	0	0	0	0	**$0**
Operating Capital Outlay	0	0	0	0	0	0	0	**$0**	0	0	0	0	0	0	**$0**
Special Categories	0	0	0	0	0	0	0	**$0**	0	0	0	0	0	0	**$0**
Total Costs	**$392,779**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$392,779**	**$920,475**	**$0**	**$0**	**$0**	**$0**	**$0**	**$920,475**

*Identify reallocation sources in Table 3.

**Includes recurring E&G funded costs ("reallocated base," "enrollment growth," and "new recurring") from Years 1-4 that continue into Year 5.

***Identify if non-recurring.

Faculty and Staff Summary

Total Positions	Year 1	Year 5
Faculty (person-years)	16.00	16.00
A & P (FTE)	0	0
USPS (FTE)	0	0

Calculated Cost per Student FTE

	Year 1	Year 5
Total E&G Funding	$392,779	$920,475
Annual Student FTE	27	60
E&G Cost per FTE	$14,547	$15,341

Table 2 Column Explanations		
Reallocated Base* (E&G)	1	E&G funds that are already available in the university's budget and will be reallocated to support the new program. Please include these funds in the Table 3 – Anticipated reallocation of E&G funds and indicate their source.
Enrollment Growth (E&G)	2	Additional E&G funds allocated from the tuition and fees trust fund contingent on enrollment increases.
New Recurring (E&G)	3	Recurring funds appropriated by the Legislature to support implementation of the program.
New Non-Recurring (E&G)	4	Non-recurring funds appropriated by the Legislature to support implementation of the program. Please provide an explanation of the source of these funds in the budget section (section III. A.) of the proposal. These funds can include initial investments, such as infrastructure.
Contracts & Grants (C&G)	5	Contracts and grants funding available for the program.
Philanthropy Endowments	6	Funds provided through the foundation or other Direct Support Organizations (DSO) to support of the program.
Enterprise Auxiliary Funds	7	Use this column for continuing education or market rate programs and provide a rationale in section III.B. in support of the selected tuition model.
Subtotal coulumns 1+...+7	8	Subtotal of values included in columns 1 through 7.
Continuing Base** (E&G)	9	Includes the sum of columns 1, 2, and 3 over time.
New Enrollment Growth (E&G)	10	See explanation provided for column 2.
Other*** (E&G)	11	These are specific funds provided by the Legislature to support implementation of the program.
Contracts & Grants (C&G)	12	See explanation provided for column 5.
Philanthropy Endowments	13	See explanation provided for column 6.
Enterprise Auxiliary Funds	14	Use this column for continuing education or market rate programs and provide a rationale in section III.B. in support of the selected tuition model.
Subtotal coulumns 9+...+ 14	15	Subtotal of values included in columns 9 through 14.

APPENDIX A

TABLE 3
ANTICIPATED REALLOCATION OF EDUCATION & GENERAL FUNDS*

Program and/or E&G account from which current funds will be reallocated during Year 1	Base before reallocation	Amount to be reallocated	Base after reallocation
29260100-101-1100 COM-Anatomy	1,536,451	335,804	**$1,200,647**
18050100-101-1100 COE-STL; 18070100-101-1100 COE HDOSE	33,900		
Graduate Student Stipends and Tuition Waivers 18050100-101-1100	16,588	4,147	**$12,441**
Postdoc Stipends 29260100-101-1100	52,827	52,827	**$0**
Totals	$1,639,767	$392,778	**$1,213,089**

APPENDIX A

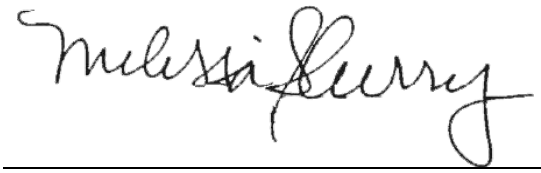
TABLE 4
ANTICIPATED FACULTY PARTICIPATION

Faculty Code	Faculty Name or "New Hire" Highest Degree Held Academic Discipline or Speciality	Rank	Contract Status	Initial Date for Participation in Program	Mos. Contract Year 1	FTE Year 1	% Effort for Prg. Year 1	PY Year 1	Mos. Contract Year 5	FTE Year 5	% Effort for Prg. Year 5	PY Year 5
A	Yehia Daaka, Ph.D. Anatomy and Cell Biology	Professor & Chair	Tenure	Fall 2018	12	1.00	0.25	0.25	12	1.00	0.25	0.25
A	Kyle Rarey, Ph.D. Anatomy and Cell Biology	Professor	Tenure	Fall 2018	12	1.00	0.25	0.25	12	1.00	0.30	0.30
A	William Dunn, Jr, Ph.D. Anatomy and Cell Biology	Professor	Tenure	Fall 2018	12	1.00	0.10	0.10	12	1.00	0.20	0.20
A	Venkatesh Nonabur, M.D. Anatomy and Cell Biology	Asst Lectr	non-Tenr	Fall 2018	12	1.00	0.10	0.10	12	1.00	0.20	0.20
A	Amanda Maxey, M.D. Anatomy and Cell Biology	Asst Prof	non-Tenr	Fall 2018	12	1.00	0.10	0.10	12	1.00	0.15	0.15
A	Moira Jackson, Ph.D. Anatomy and Cell Biology	Assoc Prof	non-Tenr	Fall 2018	12	1.00	0.10	0.10	12	1.00	0.15	0.15
A	Satya Narayan, Ph.D. Anatomy and Cell Biology	Professor	Tenure	Fall 2018	12	1.00	0.10	0.10	12	1.00	0.30	0.30
A	John Aris, Ph.D. Anatomy and Cell Biology	Assoc Prof	Tenure	Fall 2018	12	1.00	0.10	0.10	12	1.00	0.15	0.15
A	Alyson Adams, Ph.D. School of Teach & Learn	Prof	Tenure	Fall 2018	12	1.00	0.10	0.10	12	1.00	0.15	0.15
A	Kara Dawson, Ph.D. School of Teach & Learn	Professor	Tenure	Fall 2018	12	1.00	0.10	0.10	12	1.00	0.15	0.15
A	Albert Ritzhaupt, Ph.D. School of Teach & Learn	Assoc Prof	Tenure	Fall 2018	12	1.00	0.10	0.10	12	1.00	0.15	0.15
A	Rose Pringle, Ph.D. School of Teach & Learn	Assoc Prof	Tenure	Fall 2018	12	1.00	0.10	0.10	12	1.00	0.15	0.15
A	Ester De Jong, Ph.D. School of Teach & Learn	Professor & Director	Tenure	Fall 2018	12	1.00	0.10	0.10	12	1.00	0.15	0.15
A	Nancy Dana, Ph.D. School of Teach & Learn	Professor	Tenure	Fall 2018	12	1.00	0.10	0.10	12	1.00	0.15	0.15
A	Kent Crippen, Ph.D. School of Teach & Learn	Professor	Tenure	Fall 2018	12	1.00	0.10	0.10	12	1.00	0.15	0.15
A	Corine Manley, Ph.D. School of Hum Dev & Org	Assoc Prof	Tenure	Fall 2018	12	1.00	0.10	0.10	12	1.00	0.15	0.15
	Total Person-Years (PY)							**1.90**				**2.90**

Faculty Code		Source of Funding	PY Workload by Budget Classsification Year 1		Year 5
A	Existing faculty on a regular line	Current Education & General Revenue	16.00		16.00
B	New faculty to be hired on a vacant line	Current Education & General Revenue	0.00		0.00
C	New faculty to be hired on a new line	New Education & General Revenue	0.00		0.00
D	Existing faculty hired on contracts/grants	Contracts/Grants	0.00		0.00
E	New faculty to be hired on contracts/grants	Contracts/Grants	0.00		0.00
		Overall Totals for	**Year 1** **16.00**		**Year 5** **16.00**

APPENDIX B

Please include the signature of the Equal Opportunity Officer and the Library Director.



2-6-18

Signature of Equal Opportunity Officer | **Date**

2-4-18

Signature of Library Director | **Date**

This appendix was created to facilitate the collection of signatures in support of the proposal. Signatures in this section illustrate that the Equal Opportunity Officer has reviewed section II.E of the proposal and the Library Director has reviewed sections X.A and X.B.

APPENDIX C: Curriculum Vitae of Participating Faculty

College of Medicine – Department of Anatomy and Cell Biology

CURRICULUM VITAE

Yehia Daaka, PhD

Haskell Hess Professor and Chairman
Department of Anatomy and Cell Biology
University of Florida College of Medicine

Chairman, Anatomical Board of the State of Florida

1333 Center Drive, Rm B1-005
Gainesville, FL 32610
Tel: 352-273-8112
Fax: 352-846-1248
E-mail: ydaaka@ufl.edu

Date of Birth: February 1, 1960
Citizenship: U.S.A.

EDUCATION

1986	B.A. Chemistry, Eckerd College, St. Petersburg, FL
1989	M.Sc. Chemistry, University of South Florida, Tampa, FL
1995	Ph.D. (Distinction) Medical Sciences, University of South Florida College College of Medicine, Tampa, FL
1998	Postdoctoral Fellow Biochemistry, Duke University Medical Center, Durham, NC (mentor: R. J. Lefkowitz, Nobel Laureate)

ACADEMIC APPOINTMENTS

1998-2005	Assistant Research Professor (98-99), Assistant Professor (99-01), Associate Professor (01-05-tenured), Department of Surgery and Department of Pharmacology and Cancer Biology, Duke University Medical Center, Durham, NC
2000-2005	Member, Duke University Comprehensive Cancer Center, Durham, NC./Molecular Cancer Biology Graduate Program./Institutional Animal Care and Use Committee, Duke University Medical Center, Durham, NC
2005-2009	Professor and Vice Chair (tenured), Department of Pathology, Endowed Chair in Oncologic Pathology, Professor, Department of Graduate Studies, Georgia Cancer Coalition Distinguished Cancer Scholar, Member, Institute of Molecular Medicine and Genetics, Medical College of Georgia, Augusta, GA
2009-2013	Professor (tenured) and Vice Chair, Department of Urology, Professor, Department of Anatomy and Cell Biology, Scientific Director, UF Prostate Disease Center, Member, UF Shands Cancer Center, University of Florida College of Medicine, Gainesville, FL
2013-	Professor and Chairman, Department of Anatomy and Cell Biology, Member, UF Shands Cancer Center, University of Florida College of Medicine, Gainesville, FL

AWARDS and SPECIAL RECOGNITION

1985-1995	Eckerd College Academic Honors Scholarship./Student Representative, Executive Council to the Florida Chapter of the American Society for Microbiology./Distinction Award for Ph.D. thesis defense, University of South Florida College of Medicine

1996	National Institute of Drug Abuse Young Investigator Award
1998	Finalist, Career Development Award, Bourroughs Wellcome Fund
2001	Society for Basic Urologic Research Young Investigator Award
2006	Member, Steering Committee, Medical College of Georgia Cancer Center
2008	Co-Chair, Research Progress Committee, Medical College of Georgia
2005-2009	Endowed Chair in Oncologic Pathology, Medical College of Georgia
2009-	Member, Research Leadership Committee, University of Florida College of Medicine
2009-2013	David A Cofrin Endowed Chair in Urologic Oncology, University of Florida College of Medicine
2013-	Haskell Hess Professor, University of Florida College of Medicine

LEADERSHIP POSITIONS

2013-	Chairman, Department of Anatomy and Cell Biology, University of Florida College of Medicine
2013-	Chairman, Anatomical Board of the State of Florida
2013-	Member, Executive Committee, University of Florida College of Medicine
2013-	Member, Association of Anatomy, Cell Biology and Neurobiology Chairpersons
2014-2016	Member, Cancer Preeminence Coordinating Committee, University of Florida College of Medicine
2017-	Chair, Graduate Program in Biomedical Sciences Molecular and Cellular Biology concentration

MAJOR RESEARCH INTERESTS

Prognosis for patients with early stage solid tumors has improved, but the treatment options for patients with locally advanced disease and metastasis remain few. Our laboratory studies the molecular mechanisms of the regulation of cancer cell invasion and metastasis as a prelude for developing successful targeted therapies to treat these patients. Overall, our program aims to identify somatic / acquired events (genetic / epigenetic) that contribute to the modulation of the normal cellular response thereby resulting in cancer progression with the aim to improve the ability to diagnose / prognose these diseases. Specifically, a focus of our research is to characterize molecular mechanisms of mitogenic signal transduction initiated by the ubiquitous G protein-coupled receptors (GPCRs) in genitourinary (e.g. prostate and kidney) cancers. We employ molecular, cellular, and animal models to elucidate the role of the GPCRs and their effectors G proteins and Arrestins in the progression of prostate cancer from androgen-dependent to castration-resistant state, and in the metastasis of kidney cancer. A second line of investigation in the laboratory is centered on studying mechanisms involved in androgen receptor (AR) transactivation with emphasis on post-translational modification by S-nitrosylation and its role in prostate cancer progression to castration-resistant state. Lastly, we are studying the regulation of vesicle trafficking, with emphasis on the G proteins dynamin that support constriction and fission of vesicles from the plasma membrane into the cytosol in the context of active receptor endocytosis and uptake of infectious bacteria and viruses.

Current Research and Training Grant Funding

W81XWH-14-1-0243 Odedina (PI) dates: 2/1/11-1/31/18
"Florida Prostate Cancer Research Training Opportunities for Outstanding Leaders (ReTOOL) Program: Creating Opportunities for Minority HBCU Students"
Role: Co-PI

P20 CA192992 Odedina (PI) dates: 9/1/14-8/31/18
"Florida minority cancer research and training center: Feasibility studies"
Role: Co-PI and Project Leader

Fraternal Order of Eagles Daaka (PI) dates: 9/1/16-8/31/18
"Kidney cancer progression to metastasis"

UFHealth Daaka (PI) dates: 7/1/17-6/30/18
"Roles of AVPR1a in castration-resistant prostate cancer progression and treatment"

UFHealth Liao, Daaka (co-PIs) dates: 9/1/17-8/31/18
"Mechanisms of HDAC3 in prostate cancer biology and treatment"

VA Daaka, Burnstein dates: 4/25/18-4/24/22
Arginine Vasopressin Receptor 1a (AVPR1a) Antagonism as a New Treatment Paradigm for Metastatic Castration-Resistant Prostate Cancer

Pending Research Grant Funding
R01 CA228117-01 Daaka (PI)
A Dynamic Role for beta-Arrestin1 in Castration-Resistant Prostate Cancer

National Cancer Institute, NIH Liao, Daaka, Dehm (Partnering PI)
Targeting class I HDACs with novel strategy to eradicate lethal CRPC

PUBLICATION and GRANT REVIEW ACTIVITIES

1997- Reviewer for 25 peer-reviewed journals, including Biochemistry, Cancer Research, Clinical Cancer Research, Molecular Cancer Research, Endocrinology, FASEB Journal, Journal of Biological Chemistry, Journal of Cell Biology, Journal of Clinical Investigation, Journal of Neuroscience, Journal of Urology, Molecular Biology of the Cell, Molecular Endocrinology, Molecular Pharmacology, Nature, Nature Medicine, Neuroscience, Oncogene, Oncotarget, Proceedings of the National Academy of Sciences USA, and Urology.

2003- NIH George O'Brien Urology Research Center Review Group/NIH Small Business Innovation Research study section/NIH Urologic and Kidney development and Genitourinary Diseases study section/NIH Cancer Genetics study section/NIH Oncology Special Emphasis Panel/NIH Tumor Progression and Metastasis study section/NIH Drug Discovery and Molecular Pharmacology study section/NCI Omnibus/NHLBI P01/State of Pennsylvania Department of Health/Canadian Cancer Etiology Research Network/Dutch Cancer Society/Health Research Board of Ireland/Israel Science Foundation.

2011-2015 Member, NIH CAMP Study Section.

TEACHING ACTIVITIES

2003-2005 Molecular Cancer Biology (DUMC)

2005-2009 Introduction to Research (MCG); Investigation of a Problem (MCG); Biological Signaling (MCG); Advanced Topics in Neurobiology (MCG); Molecular Pathology (MCG); Fundamentals of Oncology (MCG); Course Director: Advanced Topics in Molecular Medicine (MCG)

2010- Topics in Cancer Cell Biology (UF); Grand Rounds in Urological Oncology; (UF); Undergraduate Student Independent Research BMS 4905 (UF); Science for Life IDH 3931 (UF); ReTOOL: Training Minority Students in Cancer Research (UF); Advanced Cell Biology GMS 6421 (UF); Principles of Drug Action GMS 6009 (UF); MCB Journal Club GMS 6690 (UF)

Doctoral Thesis Examination Committee

2004-2013 15 PhD candidates (Duke University, Medical College of Georgia, Griffith University, and University of Miami)

Graduate Student Thesis Committees

2005- 11 PhD/ MD, PhD students

PATENTS

2005: Preventing Bacterial or Viral Infectivity and Composition Containing Infection Preventing Additive; US No. 7,537,164.

PUBLICATIONS IN REFEREED JOURNALS (from a total 78)

1. Daaka Y, Luttrell LM, Lefkowitz RJ. Switching of the coupling of the β2-Adrenergic receptor to different G proteins by protein kinase A. Nature. 1997; 390:88-91.
2. Daaka Y, Luttrell LM, Ahn S, Della Rocca GJ, Ferguson SS, Caron MG, Lefkowitz RJ. Essential role for G protein-coupled receptor endocytosis in the activation of mitogen-activated protein kinase. J Biol Chem. 1998; 273:685-688.
3. Pitcher JA, Hall RA, Daaka Y, Zhang J, Ferguson SS, Hester S, Miller S, Caron MG, Lefkowitz RJ, Barak LS. The G protein-coupled receptor kinase 2 is a microtubule-associated protein kinase that phosphorylates tubulin. J Biol Chem. 1998; 273:12316-12324.
4. Ford CE, Skiba NP, Bae H, Daaka Y, Reuveny E, Shekter LR, Rosal R, Weng G, Yang CS, Iyengar R, Miller RJ, Jan LY, Lefkowitz RJ, Hamm HE. Molecular basis for interactions of G protein βγ subunits with effectors. Science. 1998; 280:1271-1274.
5. Lin FT, Daaka Y, Lefkowitz RJ. βArrestins regulate mitogenic signaling and clathrin-mediated endocytosis of the insulin-like growth factor I receptor. J Biol Chem. 1998; 273:31640-31643.
6. Ahn S, Maudsley S, Luttrell LM, Lefkowitz RJ, Daaka Y. Src-mediated tyrosine phosphorylation of dynamin is required for β2-Adrenergic receptor internalization and mitogen-activated protein kinase signaling. J Biol Chem. 1999; 274:1185-1188.
7. Luttrell LM, Ferguson SS, Daaka Y, Miller WE, Maudsley S, Della Rocca GJ, Lin F, Kawakatsu H, Owada K, Luttrell DK, Caron MG, Lefkowitz RJ. βArrestin-dependent formation of β2-Adrenergic receptor-Src protein kinase complexes. Science. 1999; 283:655-661.
8. Kue PF, Daaka Y. Essential role for G proteins in prostate cancer cell growth and signaling. J Urol. 2000; 164:2162-2167.
9. Fraser ID, Cong M, Kim J, Rollins EN, Daaka Y, Lefkowitz RJ, Scott JD. Assembly of an A kinase-anchoring protein-β2-Adrenergic receptor complex facilitates receptor phosphorylation and signaling. Curr Biol. 2000; 10:409-412.
10. Barki-Harrington L, Daaka Y. Bradykinin induced mitogenesis of androgen independent prostate cancer cells. J Urol. 2001; 165:2121-2125.
11. Raj GV, Barki-Harrington L, Kue PF, Daaka Y. Guanosine phosphate binding protein coupled receptors in prostate cancer: a review. J Urol. 2002; 167:1458-1463.
12. Ahn S, Kim J, Lucaveche CL, Reedy MC, Luttrell LM, Lefkowitz RJ, Daaka Y. Src-dependent tyrosine phosphorylation regulates dynamin self-assembly and ligand-induced endocytosis of the epidermal growth factor receptor. J Biol Chem. 2002; 277:26642-26651.
13. Daaka Y. Mitogenic action of LPA in prostate. Biochim Biophys Acta. 2002; 1582:265-269.
14. Kue PF, Taub JS, Harrington LB, Polakiewicz RD, Ullrich A, Daaka Y. Lysophosphatidic acid-regulated mitogenic ERK signaling in androgen-insensitive prostate cancer PC-3 cells. Int J Cancer. 2002; 102:572-579.

15. Barki-Harrington L, Bookout AL, Wang G, Lamb ME, Leeb-Lundberg LM, Daaka Y. Requirement for direct cross-talk between B1 and B2 kinin receptors for the proliferation of androgen-insensitive prostate cancer PC3 cells. Biochem J. 2003; 371:581-587.
16. Kim J, Ahn S, Guo R, Daaka Y. Regulation of epidermal growth factor receptor internalization by G protein-coupled receptors. Biochemistry. 2003; 42:2887-94.
17. Taub JS, Guo R, Leeb-Lundberg LM, Madden JF, Daaka Y. Bradykinin receptor subtype 1 expression and function in prostate cancer. Cancer Res. 2003; 63:2037-2041.
18. Bookout AL, Finney AE, Guo R, Peppel K, Koch WJ, Daaka Y. Targeting Gβγ signaling to inhibit prostate tumor formation and growth. J Biol Chem. 2003; 278:37569-37573.
19. Daaka Y. G proteins in cancer: the prostate cancer paradigm. Sci STKE. 2004; 2004:re2
20. Sivashanmugam P, Tang L, Daaka Y. Interleukin 6 mediates the lysophosphatidic acid-regulated cross-talk between stromal and epithelial prostate cancer cells. J Biol Chem. 2004; 279:21154-21159.
21. Kasbohm EA, Guo R, Yowell CW, Bagchi G, Kelly P, Arora P, Casey PJ, Daaka Y. Androgen receptor activation by Gs signaling in prostate cancer cells. J Biol Chem. 2005; 280:11583-11589.
22. Wang G, Moniri NH, Kozawa K, Stamler JS, Daaka Y. Nitric oxide regulates endocytosis by S-nitrosylation of dynamin. Proc Natl Acad Sci USA. 2006; 103:1295-1300.
23. Kelly P, Moeller BJ, Juneja J, Booden MA, Der CJ, Daaka Y, Dewhirst MW, Fields TA, Casey PJ. The G12 family of heterotrimeric G proteins promotes breast cancer invasion and metastasis. Proc Natl Acad Sci USA. 2006; 103:8173-8178.
24. Kelly P, Stemmle LN, Madden JF, Fields TA, Daaka Y, Casey PJ. A role for the G12 family of heterotrimeric G proteins in prostate cancer invasion. J Biol Chem. 2006; 281:26483-26490.
25. Whalen EJ, Foster MW, Matsumoto A, Ozawa K, Violin JD, Que LG, Nelson CD, Benhar M, Keys JR, Rockman HA, Koch WJ, Daaka Y, Lefkowitz RJ, Stamler JS. Regulation of □-Adrenergic receptor signaling by S-nitrosylation of G protein-coupled receptor kinase 2. Cell. 2007; 129:511-522.
26. Bagchi, G, Wu, JJ, French, J, Kim, J, Moniri, NH, Daaka, Y. Androgens cause the G□s-mediated activation of protein kinase A in prostate cells. Cancer Res. 2008; 68:3225-3231.
27. Lakshmikanthan, V, Zou, L, Michal, A, Kim, JI, Nie, Z, Benovic, JL, Daaka, Y. Identification of □Arrestin2 as a co-repressor of androgen receptor signaling in prostate cancer. Proc Natl Acad Sci USA. 2009; 106: 9379-9384.
28. Zhu, Y, Wu, Y, Kim, J, Daaka, Y, Nie, Z. The ArfGTPase-activating protein AGAP2 regulates focal adhesion kinase activity and focal adhesion remodeling. J Biol Chem. 2009; 284:13489-13496.
29. Wang, Z, Humphrey, C, Frilot, N, Wang, G, Nie, Z. Moniri, NH, Daaka, Y. Dynamin2- and endothelial nitric oxide synthase-regulated invasion of bladder epithelial cells by uropathogenic Escehrichia coli. J Cell Biol. 2011; 192: 101-110.
30. Wu, JJ, Zhang, Y, Frilot, N, Kim, JI, Kim, WJ, Daaka, Y. Prostaglandin E2 regulates renal cell carcinoma invasion through a EP4 receptor-Rap GTPase signal transduction pathway. J Biol Chem. 2011; 286: 33954-33962.
31. Zhang, Y, Daaka, Y. PGE2 promotes angiogenesis through EP4 and PKA C□ pathway. Blood. 2011; 118: 5355-5364.
32. Ma, X, Zhao, Y, Daaka, Y, Nie, Z. Acute activation of □2-Adrenergic receptor regulates focal adhesion through □Arrestin2- and p115RhoGEF-mediated activation of RhoA. J Biol Chem. 2012; 287: 18925-18936.
33. Li, Z, Zhang, Y, Kim, WJ, Daaka, Y. PGE2 promotes renal carcinoma cell invasion through activated RalA. Oncogene. 2013; 32: 1408-1415.

34. Qin, Y, Dey, A, Thayele Purayil, H, Daaka, Y. Maintenance of androgen receptor inactivation by S-Nitrosylation. Cancer Res. 2013; 73: 6690-6699.
35. Ma, X, Espana-Serrano, L, Kim, WJ, Purayil, HT, Nie, Z, Daaka, Y. □Arrestin1 regulates RasGRF2 expression and Rac-mediated formation of membrane protrusion and cell motility. J. Biol. Chem. 2014; 289: 13638-13650.
36. Chakraborty, PK, Zhang, Y, Coomes, AS, Kim, WJ, Stupay, R, Lynch, LD, Atkinson, T, Kim, JI, Nie, Z, Daaka, Y. GRK5 phosphorylates moesin and regulates prostate tumor metastasis. Cancer Res. 2014; 74: 3489-3500. Highlighted in Prostate Cell News.
37. Purayil, HT, Zhang, Y, Dey, A, Gersey, Z, Espana-Serrano, L, Daaka, Y. Arrestin2 modulates androgen receptor activation. Oncogene. 2015; 34: 3144-3151.
38. Park, HJ, Ran, Y, Jung, JI, Holmes, O, Price, AR, Smithson, L, Ceballos-Diaz, C, Han, C, Wolfe, MS, Hauger, RL, Daaka, Y, Ryabinin, AE, Kim, SH, Golde, TE, Felsenstein, KM. Molecular links between stress and Alzheimr's disease. EMBO J. 2015; 34: 1674-1686.
39. Black, JB, Premont, RT, Daaka, Y. Feedback regulation of G protein-coupled receptor signaling by GRKs and Arrestins. Sem Cell Dev Biol. 2016; 50: 95-104.
40. Wang, M, Daaka, Y, Dey, A. Biased adrenergic receptor and Arrestin signaling in a cell culture model of benign prostatic hyperplasia. Biochem. Biophys. Res. Comm. 2016. 471: 41-46.
41. Zhang, Y, Purayil, HT, Black, JB, Fetto, F, Lynch, LD, Masannat, JD, Daaka, Y. Prostaglandin E2 receptor 4 mediates renal cell carcinoma invasion and metastasis. Cancer Lett. 2017. 10: 50-58.
42. Masannat, J, Purayil, TH, Zhang, Y, Russin, M, Mahmud, I, Kim, WJ, Liao, D, Daaka, Y. Arrestin2 mediates renal cell carcinoma tumor growth. 2017; Submitted.
43. Kim, WJ, Shea, AE, Lotfi, FG, Kim, JH, Daaka, Y. Attachment-deficient uropathogenic Escherichia coli activate host protein networks to mediate invasion. 2017; Submitted.

CURRICULUM VITAE

NAME: Kyle E. Rarey

EDUCATION:

B.A. (Zoology), Indiana University, 1969
Ph.D. (Anatomy), Indiana University, 1977

PRESENT POSITION:

Professor, Department of Anatomy and Cell Biology, 1994 - present
Director, Center for Anatomical Sciences Education, 2017- present

PREVIOUS POSITIONS:

Interim Senior Associate Dean for Educational Affairs, 2008- 2010
Associate Dean for Program Evaluation and Faculty Development, 2002-2008
Assistant Dean for Program Evaluation and Development, 2000-2002
Coordinator, Liaison Committee on Medical Education, 1997-2000 & 2005-2007
Co-Director for Chapman Education Center (COMCEC), 1997-2000

HONORS AND AWARDS:

UF College of Medicine Teacher of the Year, five-time recipient, 1987-88, 1989-90, 1993-94, 1995-96, 1998-99 (Recognized by entire student body)
Basic Science Teacher of the Year, College of Medicine, nine-time recipient, 1993-94, 1995 96, 1996-97, 1997-98, 1998-99, 1999-00, 2002-03, 2003-04, 2006-07 (Recognized by graduating senior class)
Co-Recipient of the Golden Apple Teaching Award for recognition of the best Basic Science course, Clinical Human Anatomy, eleven-time recipient, 1992-93, 1993-94, 1994-95, 1995-96, 1996-97, 1997-98, 1998-99, 1999-00, 2001-02, 2002-03, 2003-04.
UF College of Medicine Exemplary Teacher, 2011, 2012, 2013, 2014, 2015, 2016, 2017 (Became eligible in 2011)
Florida Blue Key Distinguished Faculty Award, 1996
Teaching Improvement Award, College of Medicine, 1996
Charter Member, UF College of Medicine Society of Teaching Scholars, May 2000
Teaching Scholars Award for Sustained Excellence, 2005 - First basic science teacher at UFCOM to receive this award.
Selected as a Faculty Fellow for an LCME Survey Team, Tulane University School of Medicine, 2003.
Selected as Member of LCME Survey Team, University of Chicago School of Medicine, 2004.
Selected as Member of LCME Survey Team, Medical College of Georgia, 2008.
Advisory Board member of Gray's Anatomy for Students, August 2002.
Academy of Distinguished Teaching Scholars Committee, 2004
Section Head for Research in Medical Education (RIME) of the SGEA Southeast section of the AAMC, 2003-2005
Member of the National Steering Committee for Research in Medical Education (RIME) of the AAMC, 2003-2005
Chair, National RIME Section, 2006-2008

PROFESSIONAL ORGANIZATIONS:

American Association of Anatomists

American Association of Clinical Anatomists
American Association of Medical Colleges, Southern Group on Educational Affairs
Generalists in Medical Education (GEA), 2002-present
American Association for Research in Otolaryngology
American Academy of Otolaryngology---Head and Neck Surgery
American Education Research Association (AERA) 2007-present
International Association of Medical Science Educators (IAMSE)
Southeastern Evaluation Association, 2003
Research in Medical Education (RIME), 2000

POST GRADUATE AND POSTDOCTORAL ACTIVITIES:
Co-chairman of graduate thesis committee for Mr. Mike Sullivan, 1983-1984
Co-sponsor of Dr. David Dolan, Postdoctoral Fellow, KHRI training program, 1983-1984
Co-sponsor of Wouter-jan F. ten Cate, M.D., Ph.D., doctorate degree, 1993
Sponsor for Veronica ten Kate, M.S., 1990
Sponsor of Peter Lohuis, M.D., 1991-1992
Sponsor of Jason R. Rosenberg, M.S., 1992-94, master's thesis
Thesis committee member for Dr. D. Ian Smith, KHRI training program, 1983
Thesis: The effects of noise and quinine on the stria vascularis: An image analysis study
Thesis committee member for Ms. Dana Austin, 1987-1990
Thesis committee member for Ms. Carol Hammond, 1988-1992
Thesis committee member for Ms. Mary Gorham, 1994-1995
Postdoctoral Supervisor for Wouter ten Cate, M.D., 1989-1991
Postdoctoral Supervisor for Xiaofei Yao, M.D., 1992-1995
Postdoctoral Supervisor for Yilong Ma, Ph.D., 1994-1996
Postdoctoral Supervisor for Jian Zuo, M.D., 1994-1996

Teaching Effort/Experience
Discipline Director, Introduction to Clinical Medicine (ICM 1-4), 2012- present
Dental Gross Anatomy, 2015- present
Physician Assistant Gross Anatomy, 2015- present
Director of Block I Medical Curriculum, 1991-2012
Clinical Human Anatomy, Course Director, 1991-2012
Medical Cell and Tissue Biology, Laboratory Instructor, 1996-1999
Becoming an Effective Resident Teacher (BERT), 4th-year elective, 2004-2010
Anatomy 4th year elective, Spring, 1997-present
Medical and Dental, Phase A Gross Anatomy, Lecture and Laboratory Instructor 1984-1991
Resident Lectures, ENT Conferences, 1984-2005
Gross Anatomy, Physician Assistant Program, 1985-1990
Advanced Head and Neck Dissection Course, Residents, 1984-1986

Previous Grant Support
NIH - 5 POI NS05785-17 - Mechanisms of Sensorineural Hearing Loss Co-Investigator - 40% effort - Annual Direct Costs - $689,775, 1981 - 1984
NIH - 5 ROI NS05065 - Microscopic Studies of the Inner Ear - Co-Principal Investigator - 50% effort - Annual Direct Costs - $72,505, 1983-1984
NIH -ISIO PRO2377-01. DRR-BRS. Shared Instrumentation Grant. Inner Ear Ultrastructure and Pathology - Principal Investigator - Costs - $120,000, March, 1985. (Awarded for new transmission electron microscope at Kresge Hearing Institute)

Biomedical Research Grant, University of Michigan Medical School - NIH - The Effects of Osmotic Agents on the Perilymph-Endolymph Barrier of the Inner Ear – Annual Costs - $4,500, 1982-83

Biomedical Research Grant, University of Michigan Medical School - NIH -Inner Ear Changes in the Ferret Model for Reye's Syndrome -Annual Direct Costs - $5,000, 1983-84

Deafness Research Foundation - Study of Cochlear Permeability Barrier in Cell Culture - Principal Investigator - Annual Costs - $10,000, January, 1984 - December, 1984

American Otological Society - High Resolution of Pathological Mineralization in Otosclerosis - Principal Investigator - Annual Direct Costs - $12,895, July, 1984 - June, 1985

Division of Sponsored Research, UF Research Support for New Faculty -Study of the Inner Ear - Costs - $9,000, 1984-85

Upjohn Pharmaceutical Company, Contract - Examine the Effect of Agent U-63, 366F on the Inner Ear - Costs, $25,000, 1985 – 1986.

Division of Sponsored Research, University of Florida, Research Development Award - Virus Infection of the Inner Ear - Costs - $13,500, May, 1985 - October, 1986 Renewal - 2nd Year (January, 1985 - December, 1985), $10,000. Renewal - 3rd year (January, 1986 - December 1986), $12,500

Upjohn Pharmaceutical Company. Contract U-70, 138F: Ototoxicity Study in Guinea Pigs - Costs, $36,471, 1986 - 1987

Deafness Research Foundation - Hormonal Regulation of Na-K-ATPase Activity in the Cochlear Duct - Principal Investigator - Direct Costs, $12,500, January, 1987 - December, 1987

Veteran's Administration. AIDS: Clinical, Infectious and Morphological Studies of the Middle and Inner Ear. Subcontract with Dr. Larry Davis, Chief, Neurology Service, VAMC, Albuquerque, New Mexico - Annual Direct Costs, $24,700, July, 1988 - June, 1991

Deafness Research Foundation - Vestibular Fluid and Ion Microhomeostasis: Effect of Adrenal Steroids - Principal Investigator - K.E. Rarey. Direct Costs, 15,000, January, 1988 - December, 1988; 2nd year competitive renewal, January, 1989 - December, 1989, $15,000; 3rd year competitive renewal, January, 1990 - December, 1990

NIH - Microhomeostasis of the Cochlear Duct - Principal Investigator - K.E. Rarey. Annual Direct Costs, $61,403, 1987 - 1990

NIH - Inner Ear Adrenocorticosteroid System - Principal Investigator - K.E. Rarey. Annual Cost-Extension $81,658. 1991 - 1994

NIH - Microhomeostasis of the Cochlear Duct - Principal Investigator - K.E. Rarey. Annual - direct costs, $204,411**.** 1992 - 1996

Selected Publications (Total: 93 peer-reviewed)

55. **Rarey, K.E.,** Romrell, L.J., Pawlina, W., Rathe, R.J., Rosenberg, J.J. A computer program for teaching and self-assessment of gross anatomy. Clin Anat 8(2):l59, 1995.

56. **Rarey, K.E.,** Gerhardt, K.J. Curtis, K.M., ten Cate, W-J.F. Effect of stress on cochlear glucocorticoid protein: Acoustic stress. Hearing Res 82:135-138, 1995.

57. Yao, X., Buhi, W.C., Alvarez, I.M., Curtis, L.M., **Rarey, K.E**. *De novo* synthesis of Glucortocoid hormone regulated inner ear proteins in rats. Hearing Res 86(1-2):183-188, 1995.

58. Zuo, J., Curtis, L.M., Yao, X., ten Cate, W-J.F., Bagger-Sjoback, D., Hultcrantz, M., **Rarey, K.E.** Glucocorticoid receptor expression in the postnatal rat cochlea. Hearing Res 87:220-227, 1995.

59. Ma, Y.L., Gerhardt, K.J., Curtis, L.M., Rybak, L.P., Whitworth, C., **Rarey, K.E.** Combined effects of adrenalectomy and noise exposure on compound action Potentials, endocochlear potentials and endolymphatic potassium concentrations.

Hearing Res 91:79-86, 1995.

60. Ma, Y.L., Gerhardt, K.J., Rybak, L.P., Curtis, L.M., **Rarey, K.E.** In situ real-time potentiometric determinations of potassium concentrations from four cochlear regions in noise-exposed rats. Eur Arch ORL 253(4-5):201-204, 1996.
61. Curtis, L.M., **Rarey, K.E.** Receptors for glucocorticoids in the human inner ear. Otolaryngol Head Neck Surg 115:38-41, 1996.
62. Zuo, J., **Rarey, K.E.** Responsiveness of alpha-1 and beta-1 cochlear Na, K-ATPase isoforms to thyroid hormone. Acta Otolaryngol 116(3):422, 1996.
63. Yao, X., **Rarey, K.E.** Localization of the mineralcorticoid receptor in rat cochlear tissue: Short Communication. Acta Otolaryngol 116(3):493, 1996.
64. Ma, Y.L., **Rarey, K.E.,** Gerhardt, K.J., Curtis, L.M., Rybak, L.P. Electrochemical potentials and potassium concentration profiles recorded from perilymph, endolymph and associated inner ear tissues in adrenalectomized rats. Hearing Res 96:151-156, 1996.
65. Yao, X., **Rarey, K.E.** Localization of Cu-Zn-SOD and Mn-SOD in the rat cochlea. Acta Otolaryngol 116:833-835, 1996.
66. Yao, X., **Rarey, K.E.** Detection and regulation of Cu-Zn-SOD and Mn-SOD in the rat cochlea tissues. Hearing Res 96:199-203, 1996.
67. Davis, L.E., **Rarey, K.E.** and McLaren, L.C. Clinical, opportunistic infections, and temporal bone histological studies of AIDS patients. Neurology, 1996.
68. **Rarey, K.E.,** Ma, Y.L., Gerhardt, K.J., Fregly, M.J., Garg, L.C., Rybak, L.P. Correlative evidence of hypertension and altered cochlear microhomeostasis: electrophysiological changes in the spontaneously hypertensive rat. Hearing Res 102:63-69, 1996.
69. Erichsen, S., Zuo, J., Curtis, L.M., **Rarey, K.E.,** Hultcrantz, M. Na, K-ATPase α and β Isoforms in the developing cochlea of the mouse. Hearing Res 100:143-149, 1996.
70. Erichsen, S., Bagger Sjobäck, B., Curtis, L.M., Zuo, J., **Rarey, K.E.**, Hultcrantz, M. Appearance of glucocorticoid receptors in the developing inner ear of the mouse. Acta Otolaryngol (Stockholm) 116(5):721, 1996.
71. Zuo, J., **Rarey, K.E.** Structural maturation of the interface region between the stria vascularis and spiral ligament in the rat cochlea. Eur Arch Oto-Rhino-Laryngologica 254:73-77, 1997.
73. Yao, X, **Rarey, K.E.** Localization of the mineralocorticoid receptor in rat cochlear tissue. Acta Otolaryngol 116, 493-496, 1996.
74. ten Cate, W-J.F., Zuo, J., Lautermann, J., Altenhoff, P., and **Rarey, K.E.** Development of 11ß-hydroxysteroid dehydrogenase expression in the rat cochlea. Acta Otolaryngol 117:841-844, 1997.
75. Lippincott, L, **Rarey, KE**. Status of cochlear Na,K -ATPase in the aged SHR rat and its possible role in hearing loss. Eur Arch ORL 254:413-6, 1997.
76. Curtis, LM, Garg, LC, **Rarey, KE.** Ca(2+)-ATPase in the cochlear duct. Acta Otolaryngol (Stockholm) 117(4):553-8, 1997.
77. Zuo, J, **Rarey, KE**. Localization of secretory phospholipase A2 in mouse cochlear tissues and cultured cells. Arch Otolaryngol Head Neck Surg 123(4):373-6, 1997.
78. Ma, Y.L., **Rarey, K.E.,** Gerhardt, K.J., Rybak, L.P., Garg, L.C. Altered calcium homeo-stasis in the rat cochlear duct and endogenous corticosteroid insufficiency. Eur Arch Oto-Rhino-Laryngology 254:165-168, 1997.
79. Lipponcott, L., **Rarey, K.E.** Status of cochlear Na, K-ATPase in the aged SHR rat and its possible role in hearing loss. Eur Arch ORL 254:413-416, 1997.
80. Gerhardt, KJ, Ma, YL, Rybak, LP, **Rarey, KE**. Interaction of methylprednisolone and transient asphyxia on the inner ear of the adrenalectomized rat. Otolaryngol Head Neck Surg 118:338-43, 1998.
81. Gerhardt, KJ, Pierson, L.L., Huang, X., Abrams, R.M., **Rarey, K.E.** Effects of intense

noise exposure on fetal sheep auditory brainstem response and inner ear histology. Ear and Hearing, 20;21-32, 1999.

82. Erichsen, S., Stierna, P., Bagger-Sjoback, D., Curtis, L.M., **Rarey, K.E.,** Schmid, W., Hultcrantz, M. Na,K-ATPase in the inner ear of a mouse with a null mutation of the glucocorticoid receptor. J Hearing Res. 124:146-154, 1998
82. Pawlina W, Romrell LJ., **Rarey, K.E.,** Larkin, L.H. Problem-based learning with gross anatomy specimens: One year trial. Clin Anat 4:72, 1991.
83. Pawlina W, Ross, MH, Larkin, L.H., Romrell, L.J. and **Rarey, K.E**. Use of plastinated cadaveric specimens in medical and dental gross anatomy. Anat Rec 229:69, 1991.
85. Pawlina, W. Romrell LJ, **Rarey KE**, Larkin, L.H. Problem-based learning with gross anatomy specimens: Integration of gross and microscopic anatomy. Clin Anat 6:197, 1992.
86. **Rarey, K.E.,** Rosenberg, J.J., Pawlina, W., and Romrell, L.J. A Gross Anatomy video dissector. Anat Rec 1993.
87. **Rarey, K.E**., Rosenberg, J.J., Pawlina, W., and Romrell, L.J. A Video manual for the study of human anatomy. Clin Anat 6:374, 1993.
88. **Rarey, K.E.,** Romrell, L.J., Pawlina, W., Rathe, R.J., Rosenberg, J.J. A computer program for teaching and self-assessment of gross anatomy. Clinical Anatomy 8(2), 159, 1994.
89. **Rarey, K.E.,** Romrell, L.J., Pawlina, W., Rathe, R., and Rosenberg, J.J. Assessment of computer-assisted instruction in the teaching of Human Gross Anatomy. J Med Ed Technologies 6(3):4-9, 1997.
90. Pawlina, W., S.W. Carmichael, T.R. Viggiano, **K.E. Rarey**, M.C. Duerson and N.S. Hardt. Professionalism in medicine: A role for the gross anatomy course. Clin Anat 2000.
91. **Miller, S.A., Perrotti, W., Silverthorn D.U., Dalley, A.F., and** Rarey. K.E**.** From college to clinic: reasoning over memorization is key for understanding anatomy. Anat Rec 269:69-80, 2002.
92. Rarey, K.E.**, Novak, M.A., and Good, M.L.** University of Florida College of Medicine. Acad. Med 85: S152-155, 2010.
93**. Hagen, M., Cooke, B.K., Wright, A., and** Rarey, K.E. A five-year review of enhanced learning through integration: anatomy and clinical practice. Creative Education 8(11):1774-1781, 2017.

BOOKS, CHAPTERS AND SOFTWARE

1. **Rarey, K.E.** Chapter: The Ear, In Ross,, M., and Romrell, L.J.: Histology – A Text and Atlas, 2nd Edition. Williams and Wilkins, Baltimore, 1991 (Also published in Chinese; and Spanish and Portuguese by Pan Americana).
2. Romrell, L.J., Mancuso, A.A., Larkin, L.H., **Rarey, K.E.,** Manhan, P.E., and Ross, M.H. Sectional Anatomy of the Head and Neck with Correlative Diagnostic Imaging. Kohlhammer, Stuttgard, Germany (German and Foreign Language Editions); Lea & Febiger, Philadelphia, (English Edition) 1994.
3. **Rarey, K.E.,** Romrell, L.J., Pawlina, W., Rosenberg, J.J. Manual of Human Dissection. Gold Standard Multimedia, Gainesville, 1994.
4. **Rarey, K.E.,** Romrell, L.J., Pawlina, W., Rathe, R.J., and Rosenberg, J.J. Human Anatomy: Videodisc and Software Program. Gold Standard Multimedia, Inc., Gainesville, FL, 1994.
5. **Rarey, K.E.,** Romrell, L.J. Clinical Human Embryology. Software Program. Gold Standard Multimedia, Inc., Gainesville, FL, 2001.

CURRICULUM VITAE

William Arthur Dunn, Jr.

Contact Info: Office phone: 352-273-9007
Cell phone: 352-359-1430
Email: dunn@ufl.edu

Present Address: Department of Anatomy and Cell Biology
Univ. of Florida College of Medicine
PO Box 100235, JHMHC
B1-006
1333 Center Drive
Gainesville, FL 32610-0235

Birthdate: January 2, 1953
Birthplace: Pittsburgh, Pennsylvania

Education:

Thiel College
Greenville, Pennsylvania
1970-1974
Major: Biology
B.A., May, 1974

Pennsylvania State University
University Park, Pennsylvania
1974-1979
Major: Biochemistry
Ph.D., September, 1979

Academic Appointments:

Jan. 1984- Dec. 1986 — Johns Hopkins Univ. School of Medicine,
Research Associate
Department of Cell Biology and Anatomy

Jan. 1987- July 1993 — University of Florida College of Medicine,
Assistant Professor
Department of Anatomy and Cell Biology

Aug 1993- July 2004 — University of Florida College of Medicine,
Associate Professor
Department of Anatomy and Cell Biology

Aug 2004- — University of Florida College of Medicine,
Professor
Department of Anatomy and Cell Biology

July 2009- — University of Florida College of Medicine,

June 2013 Professor and Interim Chairman
Department of Anatomy and Cell Biology

Teaching Experience (lectures, small groups, and labs)**:**

1987-1991 BMS 5101 Cell Biology (Medical)

1987-1989 BMS 5121 Human Systems Development

1990-1996 BMS 5603 Genetics, Molecular, and Cellular Basis of Disease

1999-2004 GMS 6040 Host-Pathogen Interactions

1990- BMS 4905 Undergraduate Research

1987-1994,
2012 BMS 5180 Cell and Tissue Biology (Graduate Cell Biology)

2000- GMS 6062 Protein Sorting (Graduate Cell Biology)

2001-2004 GMS 6644 Apoptosis (**Course Director**)
2004- GMS 6644 Apoptosis (Graduate Cell Biology)

1996-2010 GMS 6001 Fundamentals of Biomedical Sciences I
2011- GMS 6001 Fundamentals of Biomedical Sciences I (**Section Leader**)
1996-1999 GMS 6002 Fundamentals of Biomedical Sciences II

2001-2004,
2014- GMS 6635 Organization of Cells and Tissues (**Course Director**)
2001-2004 GMS 6642 Organ Systems I (**Course Director**)
2001-2004 GMS 6643 Organ Systems II (**Course Director**)

1987-1998,
2001-2002 BMS 5110C Microscopic Anatomy

1999-2001 BMS 5110C Structure and Function of Cells and Tissues (**Course Director**)

2002-2011 BMS 6110 Structure and Function of Cells and Tissues (Medical Histology)

2011-2013 GMS 6690 Autophagy (MCB Journal Club) (**Course Director**)

2011- GMS 6421 Advanced Cell Biology

2012- BMS 6031 Foundations of Medicine

2013- BMS 6633 Cardiovascular and Respiratory Systems

2013- BMS 6638C Kidney and Urinary Tract

2013- BMS 6634 Gastroenterology and Hepatology

2013- BMS 6635 Dermatology and the Musculoskeletal System

2014- BMS 6632 Endocrinology and Reproduction

2014- GMS 6635 Organization of Cells and Tissues (**Course Director**)

2014- GMS 5630 Medical Histology (Online) (**Course Director**)

Honors: Graduated Cum Laude from Thiel College with Departmental Honors (1974)
Member of Beta Beta Beta (Honorary Biological Society),
Thiel College (1972) Member of Phi Kappa Phi, Penn State University (1978)
Marquis Who's Who in America (2000 - current)

Awards:

2003, 2008, 2009, 2010, 2013, 2014 Exemplary Teacher Award, University of Florida College of Medicine

Grants:

(1984 – 1986) National Institute of Health, Institute of Diabetes and Digestive and Kidney Diseases, Young Investigator Award
"Characterization of autophagic vacuolar membranes"
(AM33326-01 through -03)
PI: **William A. Dunn Jr.**

(1988 - 1992) National Institute of Health, Institute of Diabetes and Digestive and Kidney Diseases
"Studies on the mechanism of autophagy in rat hepatocytes"
(AM33326-04 through -08)
PI: **William A. Dunn Jr.**

(1991 - 1994) National Institute of Health, Institute of Neurological Disorders and Stroke
"Autophagy in glia and neurons from Batten dogs"
(NS30161-01 through -03)
PI: **William A. Dunn Jr.**

(1994 - 1998) National Institute of Health, Institute of Diabetes and Digestive and Kidney Diseases
"Involvement of ubiquitinated proteins in autophagy"
(AM33326-09 through -12)
PI: **William A. Dunn Jr.**

(1995) American Society for Biochemistry and Molecular Biology
High School Teacher Fellowship
"Characterization of a *Pichia pastoris* mutant unable to degrade peroxisomes"
Mentor: **William A. Dunn Jr** HS Teacher: Robert J. Howland, M.S.

(1999 - 2002) National Science Foundation
"Molecular Characterization of Autophagy"
(MCB-9817002)
PI: **William A. Dunn Jr.**

(2000 - 2005) National Institute of Health, Institute of Dental Research
"Interactions Between Oral Pathogens and Vascular Cells"
(DE13545-01 through -05)
PI: Ann Progulske-Fox coI: : **William A. Dunn, Jr.**

(2002 - 2007) National Cancer Institute
"Characterization of the Molecular Events of Autophagy"
(CA95552-01 through -05)
PI: **William A. Dunn Jr.** (40% effort)

(2005 - 2009) National Institute of Neurological Disorders and Stroke
"Cellular events in heritable peripheral neuropathies"
(NS041012-5 through -08)
PI: Lucia Notterpek coI: **William A. Dunn, Jr.**

(2006 - 2011) National Institute of Dental and Craniofacial Research
"Interactions Between Oral Pathogens and Vascular Cells"
(DE13545-06 through -10)
PI: Ann Progulske-Fox coPI: **William A. Dunn, Jr.**

(2009 - 2013) National Eye Institute
"Autophagy: A critical factor in RPE aging and AMD"
(EY019688-1 through -4)
PI: Michael Boulton coI: **William A. Dunn, Jr.**

(2009 - 2014) National Institute of Neurological Disorders and Stroke
"Cellular events in heritable peripheral neuropathies"
(NS041012-9 through -13)
PI: Lucia Notterpek coI: **William A. Dunn, Jr.**

(2009 - 2014) National Institute of Diabetes and Digestive and Kidney Diseases
"Autophagy in Liver Injury"
(DK079879-1 through -5)
PI: Jae-Sung Kim coI: **William A. Dunn, Jr.**

(2012 - 2013) Florida Cancer Research Program (Bankhead Coley)
"Inhibiting a core autophagy protein to treat prostate cancer"
PI: **William A. Dunn, Jr.**

(2012 - 2013) National Eye Institute
"Circadian-dependent autophagy in retinal maintenance and diabetes"
(R21 EY021626-01 through -02)
PI: Michael Boulton coI: **William A. Dunn, Jr.**

(2013 - 2015) National Institute of Dental and Craniofacial Research
"Internalization of *S. mutans* in vascular endothelial cells"
(R21 DE022690-01 through -02)
PI: Ann Progulske-Fox coI: **William A. Dunn, Jr.**

(2014 - 2019) National Heart, Lung, and Blood Institute
"*P. gingivalis* mediated disruption of autophagy in endothelial dysfunction"
(R01 HL126956-01 through -05)
PI: Ann Progulske-Fox coI: **William A. Dunn, Jr.**

Chairman of Student Graduate Committees:
Current: none
Graduated: 6 PhD students and one MS student

Member of PhD Graduate Committees:
Current: 5 PhD committees
Graduated: 36 PhD committees, 2 MD/PhD committees, 2 MS committees, one PhD (Tufts University, Boston) and one D. philos (Institute for Cancer Research, Oslo, Norway)

College of Medicine Graduate Committees:

1995-1998	Graduate Committee, Dept Anatomy and Cell Biology
1995-1997	IDP Molecular Cell Biology Advance Studies Committee
1996-1998	IDP Graduate Studies Committee (Chair)
2018-	Graduate Program in Biological Sciences Molecular Cell Biology Program (Co-Coordinator)

List of Publications:

<u>Selected Chapter in Books (Total: 11 published):</u>

Dunn, W.A., Jr., B.R. Dorn, and A. Progulske-Fox (2004) Trafficking of bacterial pathogens to autophagosomes. In Autophagy. D.J. Klionsky, editor. Landes Bioscience. p. 233-240.

Dunn, W.A., Jr., L. A. Schroder, and J.P. Aris (2013) Historical overview of autophagy. In Autophagy and Cancer. H.-G. Wang, editor. Springer Press. pp. 1-24.

Selected Peer-Reviewed Articles (Total: 87 published):

Dunn, W.A., Jr. (1990) Studies on the mechanism of autophagy: Formation of the autophagic vacuole. J. Cell Biol. 110, 1923-1933. PMID 2351689

Dunn, W.A., Jr. (1990) Studies on the mechanism of autophagy: Maturation of the autophagic vacuole. J. Cell Biol. 110, 1935-1945. PMID 2161853

Lenk, S.E., **W.A. Dunn, Jr.,** J.S. Trausch, A. Ciechanover, and A.L. Schwartz (1992) Ubiquitin-activating enzyme, E1, is associated with the maturation of autophagic vacuoles. J. Cell Biol. 118, 301-308. PMID 1321157

Aplin, A., T. Jasionowski, D.L. Tuttle, S.E. Lenk, and **W.A. Dunn, Jr.** (1992) Cytoskeletal elements are required for the formation and maturation of autophagic vacuoles. J. Cell. Physiol. 152, 458-466. PMID 1506410

Tuttle, D.L. and **W.A. Dunn, Jr.** (1995) Divergent modes of autophagy in the methylotrophic yeast *Pichia pastoris*. J. Cell Science. 108, 25-35.

Yuan, W., P. E. Strømhaug, and **W.A. Dunn, Jr.** (1999) Glucose-induced autophagy of peroxisomes in *Pichia pastoris* requires a unique E1-like protein. Mole. Biol. Cell 10, 1353-1366. PMID 10233149

Dorn, B.R., **W.A. Dunn, Jr.**, and A. Progulske-Fox (1999) Invasion of human coronary artery cells by periodontal pathogens. Infect. Immun. 67(1), 5792-5798. PMID 10531230

Kim, K., Y. Kamada, P.E. Stromhaug, J. Guan, A. Hefner-Gravink, A. Bevan, M. Baba, S. V. Scott, Y. Ohsumi, **W.A. Dunn Jr.**, and D.J. Klionsky. (2001) Cvt9/Gsa9 functions in sequestering selective cytosolic cargo destined for the vacuole. J. Cell Biol. 153(2): 381-396. (Highlighted in JCB In Brief, volume 153 (2), April 16) PMID 11309418

Dorn, B. R., **W.A. Dunn, Jr.** and A. Progulske-Fox. (2001) *Porphyromonas gingivalis* traffics to autophagosomes in human coronary artery endothelial cells. Infect. Immun. 69(9): 5698-5708. PMID 11500446

Fortun, J., **W.A. Dunn, Jr.**, S. Joy, J. Li, and L. Notterpek (2003) Emerging role for autophagy in the removal of aggresomes in Schwann cells. J. Neuro. 23:10672-10680. PMID 14627652

Chang, T., L.A. Schroder, J.M. Thomson, A.S. Klocman, A.J. Tomasini, P.E. Strømhaug, and **W.A. Dunn, Jr.** (2005) *PpATG9* encodes a novel membrane protein that traffics to vacuolar membranes which sequester peroxisomes during pexophagy in *Pichia pastoris*. Mol Biol Cell. 16(10):4941-53. PMID 16079180

Amici, S.A., **W.A. Dunn, Jr.**, and L. Notterpek (2007) Developmental abnormalities in the nerves of peripheral myelin protein 22-deficient mice. J. Neurosci. Res. 85:238-249. PMID 17131416

Wohlgemuth, S.E., D. Julian, D.E. Akin, J. Fried, K. Toscano, C. Leeuwenburgh, **W.A. Dunn, Jr.** (2007) Autophagy in the heart and liver during normal aging and calorie restriction. Rejuvenation Res. 10(3): 281-292. PMID 17665967

Klionsky, D.J., A.M Cuervo, **W.A. Dunn, Jr.**, B. Levine, I. van der Klei, and P.O. Seglen (2007) How shall I eat thee?. Autophagy. 3(5): 413-416. PMID 17568180

Schroder, L.A., M.V. Ortiz, and **W.A. Dunn, Jr.** (2008) The membrane dynamics of pexophagy are influenced by Sar1p in Pichia pastoris. Mol Biol Cell. 19: 4888-4899. PMID 18768759

Madorsky, I., K. Opalach, A. Waber, J. Verrier, C. Solmo, T. Foster, **W.A. Dunn, Jr.**, and L. Notterpek (2009) Intermittent fasting alleviates the neuropathic phenotype in a mouse model of Charcot-Marie-Tooth disease. Neurobiol Dis. 34: 146-154. PMID 19320048

Rangaraju, S., J. D. Verrier, I. Madorsky, J. Nicks, **W.A. Dunn, Jr**, and L. Notterpek (2010) Rapamycin activates autophagy and improves myelination in explant cultures from neuropathic mice J. Neurosci., 30: 11388 – 11397. PMID 20739560

Wang, J-H., I-S. Ahn, T.D. Fischer, J-I. Byeon, **W.A. Dunn, Jr**, K. E. Behrns, C. Leeuwenburgh, and J.-S. Kim (2011) Autophagy suppresses age-dependent ischemia and reperfusion injury in livers of mice. Gastroenterology, 141: 2188-99. PMID 21854730

Reyes, L., P.H. Rodriques, A.S. Chadda, M. Belanger, E. Eiler-McManis, P. Phillips, S.M. Wallet, A.G. Barrett, D. Akin, **W.A. Dunn, Jr.**, and A. Progulske-Fox. (2013) Deletion of lipoprotein PG0717 in Porphyromonas gingivalis W83 Reduces Gingipain Activity and Alters Trafficking in and Response by Host Cells. PloS One 8(9): e74230. PMID 24069284

Akin, D., S.K. Wang, P. Habibzadegah-Tari, B. Law, D. Ostrov, M. Li, X.-M. Yin, J.-S. Kim, N. Horenstein, and **W.A. Dunn, Jr.** (2014) A novel ATG4B antagonist inhibits autophagy and has a negative impact on osteosarcoma tumors. Autophagy. 10(11): 2021-35. PMID 25483883

CURRICULUM VITAE

VENKATESH NONABUR, M.Sc, MD.

Academic appointments- **Assistant Scholar**

5/2000- Present
Assistant Scholar, Anatomy and Cell Biology
College of Medicine, University of Florida, Gainesville, Fl

3/1997 – 4/99 Research asst. Neuroscience, UFBI, Gainesville, Fl. 32611

1994-1995 Clinical rotatory Internship. Kasturba Hospital. Manipal, India

1987-1990 Asst. Professor, Anatomy, KMC(Uni .Mysore) Manipal, India.

1981- 1987 Lecturer, Anatomy, College of Meicine, Maiduguri, Nigeria

1978-1981 Asst. Professor, Anatomy, KMC(Uni .Mysore) Manipal, India

1975- 1978 Demonstrator in Anatomy, CMC, Ludhiana, India.

EDUCATION:

1995 Doctor of Medicine (MD)
Mangalore University Karnataka st. KMC India

1974 Master of Science (M.Sc) - Human Anatomy, University of Mysore,India

1997 - ECFMG (USMLE)

Teaching Effort/Experience

. MEL 7940	Clinical Anatomy-	Course Director
. GMS 6607C	Musculoskeletal system-	Course Director
. PAS 5022	Physician Assistant Gross Anatomy-	Course Director
. DEN 6416C	Advanced Head & Neck Anatomy –	Course Director
. DEN 5100C	Dental Gross Anatomy -	Course Director
. BMS 6810-ICM -1	Introduction to Clinical Medicine	
BMS 6812-ICM -2	Introduction to Clinical Medicine	
. BMS 6813-ICM -3	Introduction to Clinical Medicine	
. BMS 6814-ICM -4	Introduction to Clinical Medicine	
.PAS 5008	Advanced Clinical lab	

Workshop
Javmed.com - Anesthesiology, The annual Gator RAP Workshop- Regional anesthesia Training-cadaver ultrasound-guided injection & dissection

AWARDS

Co Recipient of Golden Apple Award in Basic Sciences, 2000, UF College of Medicine, University of Florida:

University of Florida, Exemplary teaching award- 10 year award -2016

Publication and Abstract-- 3

Survival of Human embryonic spinal cord xenografts in exceptionally chronic Contusion lesions.
E.D.Wirth.III, B.C.Hains, V.Nonabur, M.A.Giovanini, P.J. Reier, and D.K. Anderson
Seventh International Symposium on Neural Regeneration.
Experimental Neurology 151, 143-171 (1998)

First report of lymph sampling/lymphangiography by EUS guided transesophageal thoracic duct puncture in a swine model.
Parasher VK, Hernandez LV, LeVeen RF, Mladnich CRJ, Nonabur V, Bhutani MS
American Society for Gastrointestinal Endoscopy, May 1[1]-23,2002, San Francisco, CA
Gastrointestinal Endoscopy 2002;55(5):AB231

Lymph sampling and lymphangiography via EUS-guided transesophageal thoracic duct puncture in a swine model.
Parasher VK, Hernandez LV, Leveen RF, Mladinich CR, Nonabur V, Bhutani MS
Gastrointest Endosc 2004 April; 59 (4):564-7.

CURRICULUM VITAE

AMANDA G. MAXEY, M.D.

Contact Information: 352-273-8899
amaxey@ufl.edu

Work History:

Assistant Professor
Department of Anatomy and Cell Biology
University of Florida
2017-Present

The Orthopedic Institute
PO Box 13476
Gainesville, FL 32604-1476
352-336-6000
04/1999 to 09/30/2012

UF & Shands Orthopedic and Sports
Medicine Institute
Adjunct Assistant Professor
Volunteer Clinician in Orthopedics at ACORN clinic
Gainesville, FL
02/2013 to 04/2015

University of Florida Department of Anatomy and Cell Biology
Volunteer Assistant in Gross Anatomy Lab
03/2016 to 2017

Teaching Experience:

Lab Assistant
Elementary Physiology
Furman University
One Trimester

Personal Tutor
Anatomy and Physiology
Santa Fe College
One Semester

Lab Assistant - Volunteer
Gross Anatomy
University of Florida
02/2016 to present

Patient Education
The Orthopedic Institute and The ACORN clinic
1999 to 2015

Education:	Furman University Bachelor of Science in Biology Greenville, South Caroliina Graduated Magna Cum Laude 08/1985 to 06/1989
	University of Florida College of Medicine Gainesville, FL Graduated First in Class 08/1989 to 06/1993
	Shands at the University of Florida Gainesville, FL 07/1993 to 06/1998 Orthopedic Residency
	Crystal Clinic Akron, OH 08/1998 to 01/1999 Orthopedic Foot & Ankle Fellowship
Honors and Awards:	Phi Beta Kappa - Furman University Alph Omega Alpha - University of Florida College of Medicine
Board Certification:	American Board of Orthopaedic Surgery, Diplomate Certification Date: 07/12/2001 to 12/31/2011 01/01/2012 to 12/31/2021
Professional Affiliations:	American Academy of Orthopaedic Surgery American Foot & Ankle Society

CURRICULUM VITAE

Name: Moira Russell Jackson, PhD
Associate Professor

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Present Address: Department of Anatomy and Cell Biology
Univ. of Florida College of Medicine
PO Box 100235, JHMHC
D2-32F
1333 Center Drive
Gainesville, FL 32610-0235

Education:

University of Aberdeen
Aberdeen, Scotland
1980-1984
Major: Anatomy
B.Sc. (Hons) June 1984

University of Aberdeen
Aberdeen, Scotland
1984-1989
Major: Placental Stereology
Ph.D., November, 1989

Academic Appointments:

October 1989- October 1991	Oxford University University Lecturer Department of Anatomy and Cell Biology Oxford University, England
November 1991- May 1994	Post Doctoral Fellowship Samuel Lunenfeld Research Institute, Mount Sinai Hospital, Toronto, Canada
September 1994- April 1997	Post Doctoral Fellowship Department of Molecular and Cell Biology, University of Aberdeen, Aberdeen, Scotland
September 1997- September 2002	Research Associate The Toronto Hospital Research Institute University of Toronto, Canada

October 2002- June 2006	Research Assistant Professor Department of Anatomy and Cell Biology University of Florida Florida, USA
October 2002- June 2006	Research Assistant Professor Department of Anatomy and Cell Biology University of Florida Florida, USA
July 2006 - April 2015	Lecturer in Anatomy and Cell Biology, University of Florida, Florida USA
February 2008- April 2015	Executive director of the Anatomical Board of the State of Florida University of Florida, Florida, USA
June 2015- April 2016	Discipline Chair of Anatomy VCOM, Auburn, Alabama, USA
April 2016- December 2017	Associate Professor of Anatomy, Samford University Birmingham, Alabama, USA
January 2018-	Research Associate Professor Department of Anatomy and Cell Biology, University of Florida Florida, USA

Teaching Experience (lectures, small groups, labs):

1989-1991	Taught Anatomy, Histology and Embryology to medical students
1991-1994	Taught laboratory techniques to graduate students and placental development and Embryology to undergraduates
1994-1997	Taught cell isolation to graduate students
1997-2002	Taught cell isolation, confocal microscopy and recombinant DNA technology to Graduate students
2003-2015	DEN 5100C Dental Gross Anatomy (course director)
2006-2015	DEN 5126C Dental Histology (course director)
2009-2015	DEN 6416C Dental Board Preparation Course (course director)

2003-2015 PAS 5022 Physician Assistant Anatomy Course

2012-2013 BMS 4095 Artist Anatomy Course (course director)

2006-2008 Taught Anatomy Course to Biomedical Engineers

2015-2016 7100 Musculoskeletal System to Osteopathic Physicians (course director)

2015-2016 7110 Neuroanatomy and Head and Neck (course director)

2016-2017 PHTH610 Anatomy for Physical Therapists (course director)

2016-2017 NUNA Anatomy for Nurse Anesthesiologists (course director)
2018 ICM 4 – Anatomy for Medical Students
2018 DEN 5126C – Histology for Dental Students

Honors: Executive Director of Anatomical Board of the State of Florida 2008-2015
Exemplary Teacher Awards, university of Florida College of Medicine 2007-2014

List of Publications:

1. Chretien, ML., Zhang, M., **Jackson, MR**., Kapus, A.& Langille, BL. (2010) Mechanotransduction by endothelial cells is locally generated, direction dependent and ligand specific. *Journal of Cellular Physiology, 224(2): 352-61*

2. Joo, JH., Lee, YJ., Munguba, G.C., Park, s., Taxter, T.J., Elsagga, M.Y., **Jackson, M.R.** & Sugrue, S.P. (2007) Role of Pinin in Neural Crest, Dorsal Dermis, and Axial Skeleton Development and its Involvement in the Regulation of Tcf/Lef activity in Mice. *Developmental Dynamics, 236(8): 2147-58*.

3. McCue, S., Dajnowiec, D., Xu, F., Zhang, M., **Jackson, M.R**. & Langille, B.L. (2006) Shear Stress Regulates Forward and Reverse Planar Cell Polarity of Vascular Endothelium In Vivo and In Vitro. *Circulation Research, 98(7): 939-46.*

4. *Joo, J.H., Alpatov, R. Munguba, G.C., **Jackson, M.R**., Hunt, M.E. & Sugrue S.P. (2005) Reduction of Pnn by RNAi induces loss of cell-cell adhesion between human corneal epithelial cells. Molecular Vision, 11, 133-142.*

5. Zimowska, G., Shi, J., Munguba, G., **Jackson, M.R**., Alpatov, R., Simmons, M.N., Shi Y. & Sugrue, S.P. (2003) Pinin/DRS/memA Interacts with Srp75, SRm300 and SRrp130 in Corneal Epithelial Cells. *Investigative Ophthalmology & Visual Science, 44, 4715-4723*.

6. Hindmarsh, P.C., Geary, M.P., Rodeck, C.H., **Jackson, M.R**. & Kingdom, J.C. (2000) Effect of early maternal iron stores on placental weight and structure. *Lancet 356, 719-723.*

7. **Jackson, M.R.**, Gott, P., Ritchie, J.W.K. & Clapp, J.F. (1995) The effects of maternal

aerobic exercise on human placental development: Placental volumetric composition and surface areas. *Placenta 16, 179-191*

8. **Jackson, M.R**.,Walsh, A.J., Morrow, R.J., Mullen, J.B.M., Lye, S.J & Ritchie, J.W.K. (1995) Reduced placental villous tree elaboration in small-for-gestational-age pregnancies: relationship with umbilical artery Doppler waveforms. American *Journal of Obstetrics and Gynecology, 172, 518-525.*

9. **Jackson, M.R**., Carney, E.W., Lye, S.J & Ritchie, J.W.K. (1994) Immunolocalisation of two angiogenic growth factors (PDECGF and VEGF) in human placental villi throughout gestation. *Placenta 15, 341-353.*

10. Mayhew,T.M., Sorensen, F.B., Klebe, J.G. & **Jackson, M.R.** (1994) Growth and maturation of villi in placentae from well-controlled diabetic women. *Placenta 15, 57-65*.

11. **Jackson, M.R.**, Mayhew, T.M. & Boyd, P.A. (1993) Changes in oxygen diffusive conductances of human placentae during gestation (10-41 weeks) are commensurate with gain in fetal weight. *Placenta 14, 51-61*.

12. Mayhew, T.M., Sorensen, F.B., Klebe, J.G. & J**ackson, M.R.** (1993a) Oxygen diffusive conductance in placentae from control and diabetic women. *Diabetologia 34, 955-960.*

13. Mayhew, T.M., Sorensen, F.B., Klebe, J.G. & **Jackson, M.R.** (1993b) The effects of mode of delivery and sex of newborn on placental morphology in control and diabetic pregnancies. *Journal of Anatomy 183, 545-552.*

14. **Jackson, M.R**., Mayhew, T.M. & Boyd, P.A. (1992) Quantitative description of the elaboration and maturation of villi from 10 weeks of gestation to term. *Placenta 13, 357-37*

15. Mayhew, T.M., **Jackson M.R**. & Haas, J.D. (1990) Oxygen diffusive conductance of human placentae from term pregnancies at low and high altitudes. *Placenta 11, 493-503*

16. **Jackson, M.R.**, Mayhew, T.M. & Haas, J.D. (1988a) On the factors which contribute to thinning of the villous membrane in human placentae at high altitude. I. Thinning and regional variation in thickness of trophoblast. *Placenta 9, 1-8.*

17. **Jackson, M.R.**, Mayhew, T.M. & Haas, J.D. (1988b) On the factors which contribute to thinning of the villous membrane in human placentae at high altitude. II. An increase in the degree of peripheralisation of fetal capillaries. *Placenta 9, 9-18.*

18. **Jackson, M.R**., Mayhew, T.M. & Haas, J.D. (1988c) Effects of high altitude on the vascularisation of terminal villi in human placentae. *Trophoblast Research 3, 351-360*.

19. **Jackson, M.R**., Mayhew, T.M. & Haas, J.D. (1987a) The volumetric composition of human term placentae: altitudinal, ethnic and sex differences in Bolivia. *J. Anat. 152, 173-187.*

20. **Jackson, M.R.,** Mayhew, T.M. & Haas, J.D. (1987b) Morphometric studies on villi in

human term placentae and the effects of altitude, ethnic grouping and sex of newborn. *Placenta 8, 487-2*

21. **Jackson, M.R**., Mayhew, T.M. & Hass, J.D. (1987c) Placental diffusing capacity for oxygen in populations residing at low and high altitude in Bolivia. *Acta Stereologica 6/III, 249-253.*

22. Mayhew, T.M., **Jackson, M.R**. & Haas, J.D. (1986) Microscopical morphology of the human placenta and its effects on oxygen diffusion: a morphometric model. *Placenta 7, 121-131*.

23. **Jackson, M.R**., Joy, C.F., Mayhew, T.M. & Haas, J.D. (1985) Stereological studies on the true thickness of the villous membrane in human term placentae: a study of placentae from high altitude pregnancies. *Placenta 6, 249-258.*

Book Chapters:

1. Chretien, M., Noria, S.F., **Jackson, M.R.**, Langille, B.L. (2006) Vascular adaptations to blood flow. Chapter 43, p667- 678 in: Haemostasis and Thrombosis: Basic Principles in Clinical Practice, *Fifth Edition, Ed. R.W. Coleman et al. Lippincott.*

2. **Jackson, M.R**. & Sugrue, S.P. (2006) Cutaneous Melanoma. Chapter 77 in Principles of Molecular Medicine. *Ed. Runge, M.S. et al. Humana Press, NJ.*

Curriculum Vitae

Satya Narayan, Ph.D.
Professor
Department of Anatomy and Cell Biology

A. ACADEMIC APPOINTMENTS

2007-present	Professor, Dept. of Anatomy and Cell Biology, University of Florida, Gainesville, FL
2001-2007	Associate Professor, Dept. of Anatomy and Cell Biology, University of Florida,
2000-present	Graduate Faculty at the University of Florida, Gainesville, FL
2000-present	Member of the UF Shands Cancer Center, University of Florida, Gainesville, FL
2000-2001	Assistant Professor, Dept. of Anatomy and Cell Biology, University of Florida
1999-2000	Graduate Faculty at the University of Texas Medical Branch, Galveston, TX
1996-2000	Member, Sealy Center for Oncology & Hematology, UTMB, Galveston, TX
1996-2000	Assistant Professor, Dept. of Human Biological Chemistry & Genetics, UTMB, Galveston, TX
1993-1996	Scientist, Sealy Center for Molecular Science, UTMB, Galveston, TX
1991-1993	Instructor, Dept. of Human Biological Chemistry & Genetics, UTMB, Galveston, TX
1985-1987	Chemist-in-charge, Curewell India Pvt., Ltd., Faridabad, Haryana, India

B. EDUCATION:

Institution	Degree	Year	Subject
University of Allahabad, India	BS (B.Sc.)	10/1978	Biology
University of Allahabad, India	MS (M.Sc.)	07/1981	Biochemistry
Panjab University Chandigarh, India	Ph.D.	08/1989	Biochemistry
Louisiana State Univ., Baton Rouge, LA	Postdoctoral	1987-1989	Drug Metabolism
UTMB, Galveston, TX	Postdoctoral	1989-1991	Colon Cancer

C. TEACHING EFFORT/EXPERIENCE:

EXPERIENCE –
COURSE DIRECTOR
2001 – present: Tumor Biology – GMS 6064 [Graduate Program in Biomedical Sciences]
2011 – present: Advanced Cell Biology – GMS 6421 [Graduate Program in Biomedical Sciences]

TEACHING
School of Dentistry:
Advanced Biochemistry, Cell and Molecular Biology – DEN 5121C (Spring 2001 – present):

- Cell organization
- Macromolecules: Phospholipids and cell membranes
- Membrane transport I and II
- Cell compartments I – IV
- Cell signaling I and II
- Cell Cycle I and II
- Cell Division
- Cancer and apoptosis

Graduate Program in Biomedical Sciences:
Advanced Cell Biology – GMS 6421 (Spring 2012 – present)
Apoptosis – GMS 6644 (Spring 2002- present)
Cell Biology – GMS 6001: Transport system (Fall 2000, 2001, 2003)
Cell Biology – GMS 6643: Organ System II – Colon cancer (Fall 2001)
Fundamentals of Biological Sciences – GMS 6001 (Fall 2015 – present)
Fundamentals in Cancer Biology – GMS 6065 (Spring 2003 – present)
Independent Studies in Zoology – ZOO 4905-7681 Role of p21Waf1/Cip1 in DNA repair (Spring and Fall 2002)
Organ System II – GMS 6643 (Fall 2002, 2003)
Protein Trafficking (Import in Peroxisomes and nucleus) – GMS 6062 (Spring 2010 – present)
Transcriptional and translation control of cell growth and proliferation – GMS 6647 (2006 – present)
Tumor Cell Biology – GMS 6064 (Spring 2001 – present):
Principles of drug action – GMS 6009 (Spring 2015 – present)

D. AWARDS:
2016-17 Exemplary Teachers Award, College of Medicine, University of Florida
2012-13 Exemplary Teachers Award, College of Medicine, University of Florida
2011-12 Exemplary Teachers Award, College of Medicine, University of Florida
2007 Who's Who In America – 62st Edition, Biography
2006 Who's Who In America – 61st Edition, Biography
2005 Who's Who In America – 60th Diamond Edition, Biography
2004 Who In Medicine And Healthcare – 5th Edition, Biography
2002 Clinical Innovator Award By Flight Attendants Medical Research Institute, Miami, FL
2001 Winner Of The Ralph E. Powe Junior Faculty Enhancement Award In Applied Sciences Given By Oak Ridge Associated Universities, Oak Ridge, TN
2000 Who's Who In America, 55th Edition, Biography

E. GRANTS AWARDS:
<u>Present</u> –

1. Title: Loss of a functional APE1/Aryl hydrocarbon Receptor complex underlies cigarette smoke-induced lung carcinogenesis

Principal investigator: Satya Narayan
Agency: Department of Medicine, College of Medicine, University of Florida
Type: Royalty Fund Award
Period: 5/16/2016 – 5/15/2018
Indirect cost: $10,000
Percent effort: 10%
Goal: The overall goal of these studies is to examine the molecular mechanisms of the involvement of APE1 and AhR in cigarette smoke-induced lung carcinogenesis. This fund is provided as a seed money for developing a competitive project for extramural funding.

Past –

1. Title: Mechanism of secondhand cigarette smoke-induced transformation of normal breast epithelial cells
   Principal Investigator: Satya Narayan, Ph.D.
   Agency: Flight Attendant Medical Research Institute
   Type: Clinical Innovator Award (CIA-072088)
   Period: July 1, 2008 – June 30, 2012 (no cost extension)

2. Title: Tumor suppressor APC and breast carcinogenesis
   Principal Investigator: Satya Narayan, Ph.D.
   Agency: NIH/NCI
   Type: RO1-CA100247
   Period: June 1, 2003 – May 31, 2009

3. Title: Involvement of APC in DNA repair
   Principal Investigator: Satya Narayan, Ph.D.
   Agency: NIH/NCI
   Type: RO1-CA097031
   Period: June 1, 2003 – May 30, 2008

4. Title: Mechanism of secondhand smoking-induced breast carcinogennesis
   Principal Investigator: Satya Narayan, Ph.D.
   Agency: Flight Attendants Medical Research Institute, Miami, FL
   Type: The Clinical Innovator Award (CIA-24027)
   Period: July 1, 2003 – June 31, 2006
   Percent effort: 20%

5. Title: Interaction of APC and p53 in colorectal carcinogenesis
   Principal Investigator: Satya Narayan, Ph.D.
   Agency: National Cancer Institute – National Institutes of Health
   Type: RO1-CA77721-4
   Period: January 1, 1999 – January 31, 2003

6. Title: Role of tumor suppressor APC in colorectal carcinogenesis
   Principal Investigator: Satya Narayan, Ph.D.
   Agency: Oak Ridge Associated Universities, Oak Ridge, TN
   Type: The Ralph E. Powe Junior Faculty Enhancement Award
   Period: May 4, 2001 – May 3, 2002

7. Title: Mechanism of transcriptional regulation of adenomatous polyposis coli (*APC*) gene expression in colon cancer cells
   Principal Investigator: Satya Narayan, Ph.D.
   Agency: American Cancer Society
   Type: Institutional Research Grant (Proposal #2047-96C)

Period: December 1996 – January 1997

RESEARCH ARTICLES – Past 10 years (total: 98 published)

1. **Narayan S,** Jaiswal AS. Activation of adenomatous polyposis coli (*APC*) gene expression by the DNA-alkylating agent N-methyl-N'-nitro-N-nitrosoguanidine requires p53. **J. Biol. Chem.** 272: 30619-30622, 1997.
2. Jaiswal AS, **Narayan S.** Protein synthesis and transcriptional inhibitors control N-methyl-N'-nitro-N-nitrosoguanidine-induced levels of *APC* mRNA in a p53-dependent manner. **Int. J. Oncol.** 13: 733-740, 1998.
3. Jaiswal AS, **Narayan S.** Protein synthesis inhibitor-mediated stability of adenomatous polyposis coli (*APC*) mRNA levels in HCT-116 Colon Cancer Cells. **Int. J. Oncol.** 14: 1045-1048, 1999.
4. Jaiswal AS, Kennedy CH, **Narayan S.** A correlation of *APC* and *c-myc* mRNA levels in lung cancer cell lines. **Oncol. Rep.** 6: 1253-1256, 1999.
5. **Narayan S,** Wilson SH. Kinetic analysis of Sp1-mediated transcriptional activation of a TATA-box containing promoter. **Biochemistry** 39: 818-823, 2000.
6. Pathak S, Multani AS, **Narayan S,** Kumar V, Newman RA. Anvirzel^{TM}: an extract of Nerium Oleander induces cell death in human cancer but not in murine cancer cells. **Anticancer Drugs 11:** 455-463, 2000.
7. Multani AS, Ozen M, **Narayan S,** Kumar V, Chandra J, McConkey DJ, Newman RA, Pathak S. Caspase- and p53-dependent apoptosis induced by telomere cleavage and TRF2 loss. **Neoplasia** 2: 339-345, 2000.

   Note: This article is featured on the cover page of the journal.

8. **Narayan S,** Wilson SH. Kinetic analysis of Sp1-mediated transcriptional activation of the human DNA polymerase-beta promoter. **Oncogene** 19: 4729-4735, 2000.
9. Jaiswal AS, **Narayan S.** Upstream stimulating factors-1 (USF1) and USF2 bind and activate the promoter of adenomatous polyposis coli (*APC*) tumor suppressor gene. **J. Cell. Biochem.** 81: 262-277, 2001.
10. Jaiswal AS, **Narayan S.** p53-dependent transcriptional regulation of the adenomatous polyposis coli (*APC*) promoter in colon cancer cells treated with DNA alkylating agents. **J. Biol. Chem.** 276: 18193-18199, 2001.
11. **Narayan S,** Jaiswal AS, Multani AS, Sen P. DNA damage-induced apoptosis involves both p53-dependent and independent pathways: role of telomere repeat binding factor 2. **Br. J. Cancer** 85: 898-901, 2001.
12. Jaiswal AS, **Narayan S.** DNA alkylation-induced phosphorylation of p53 and activation of kinases in colon cancer cells. **Int. J. Oncol.** 19: 613-616, 2001.
13. Pathak S, Multani AS, Newman RA, **Narayan S,** Kumar V. Oleander extract induces cell death in human but not murine cancer cells. **Anticancer Drugs** 12: 637-638, 2001.
14. Jaiswal AS, **Narayan S.** S_N2 DNA-alkylating agent-induced phosphorylation of p53 and activation of *p21* gene expression. **Mut. Res.** 500: 17-30, 2002.
15. Jaiswal AS, Bloom LB, **Narayan S.** Long-patch base excision repair of apurinic/apyrimidinic site DNA is decreased in mouse embryonic fibroblast cell lines treated with plumbagin: Involvement of cyclin-dependent kinase inhibitor p21(Waf-1/Cip-1). **Oncogene** 21: 5912-5922, 2002.
16. Multani AS, **Narayan S,** Jaiswal AS, Zhao YJ, Dworak RA, Furlong CL, Pathak S. Telomere

dynamics, mitotic catastrophe and cancer: A study of human syndromes representing premature aging. **J. Anti-Aging Medicine** 5: 271-282, 2002.
17. Jaiswal AS, Marlow BP, Gupta N, **Narayan S.** Beta-catenin-mediated transactivation and cell-cell adhesion pathways are important in curcumin (diferuylmethane)-induced growth arrest and apoptosis in colon cancer cells. **Oncogene** 21: 8414-8427, 2002.
18. Jaiswal AS, Multani AS, Pathak S, **Narayan S.** N-methyl-N'-nitro-N-nitrosoguanidine-induced senescence-like growth arrest in colon cancer cells is associated with loss of adenomatous polyposis coli protein, microtubule organization and telomeric DNA. **Mol. Cancer** 3: 3-15, 2004.
19. Pathak S, Multani AS, **Narayan S,** Furlong CL, Hsu TC. Germline telomere length dynamics and mutagen sensitivity studies in a family having acute reactions to sun exposure: Involvement of three generations. **Cancer Genomics & Proteomics** 1: 199-208, 2004.

Note: This article is featured on the cover page of the journal.

20. **Narayan S,** Jaiswal AS, Kang D, Srivastava P, Das GM, Gairola CG. Transformation of normal human breast epithelial cells by cigarette smoke condensate. **Oncogene** 23: 5880-5889, 2004.
21. Jaiswal AS, **Narayan S.** Zinc stabilizes adenomatous polyposis coli (APC) protein levels and induces cell cycle arrest in colon cancer cells. **J. Cell. Biochem.** 93: 345-357, 2004.
22. Jaiswal AS, **Narayan S.** Decreased levels of the adenomatous polyposis coli (APC) protein are associated with ceramide-induced apoptosis in colon cancer cells. **J. Cancer Res. Clin. Oncol.** 130: 695-703, 2004.
23. **Narayan S,** Jaiswal AS, Balusu R. Tumor suppressor APC blocks DNA polymerase β-dependent strand-displacement synthesis and increases sensitivity to DNA methylation. **J. Biol. Chem.** 280: 6942-6949, 2005.
24. Jaiswal AS, Balusu R, **Narayan S.** 7,12-dimethylbenzanthracene-dependent transcriptional regulation of *adenomatous polyposis coli (APC)* gene expression is mediated by GC-box binding protein Sp3. **Carcinogenesis** 27: 252-261, 2006.
25. Jaiswal AS, Balusu R, Kundu CN, Armas ML, **Narayan S.** Mechanism of adenomatous polyposis coli-mediated blockage of long-patch base excision repair. **Biochemistry** 45: 15903-15914, 2006.
26. Kundu CN, Balusu R, Jaiswal AS, Gairola CG, **Narayan S.** Cigarette smoke condensate-induced levels of adenomatous polyposis coli (APC) block long-patch base excision repair in breast epithelial cells. **Oncogene** 26: 1428-1438, 2007.
27. Kundu CN, Balusu R, Jaiswal AS, **Narayan S.** Adenomatous polyposis coli-mediated hypersensitivity of mouse embryonic fibroblast cell lines to methylmethane sulfonate treatment: implication of base excision repair pathways. **Carcinogenesis** 28: 2089-2095, 2007.
28. *Balusu R, *Jaiswal AS, Armas ML, Bloom LB, **Narayan S.** Structure/function analysis of the interaction of adenomatous polyposis coli (APC) with DNA polymerase and its implications for base excision repair. **Biochemistry** 46: 13961-13974, 2007.
*Equal contribution
29. Jaiswal AS, **Narayan S.** A novel function of adenomatous polyposis coli (APC) in DNA repair. **Cancer Lett.** 271: 272-280, 2008.
30. Connors SK, Balusu R, Kundu CN, Jaiswal AS, Gairola CG, **Narayan S.** C/EBPβ-mediated transcriptional regulation of *bcl-xl* gene expression in human breast epithelial cells in response to cigarette smoke condensate. **Oncogene** 28: 921-932, 2009.

31. Ye CJ, Stevens JB, Liu G, Bremer SW, Jaiswal AS, Ye KJ, Lin M-F, Lawrenson L, Lancaster WD, Kurkinen M, Liao JD, Gairola CG, Shekhar MPV, **Narayan S,** Miller FR and Heng HH. Genome based cell population heterogeneity promotes tumorigenicity: the evolutionary mechanism of cancer. **J. Cell. Physiol.** 219: 288-300, 2009.
32. Jaiswal AS, Aneja R, Connors SK, Joshi HC, Multani AS, Pathak S, **Narayan S.** 9-Bromonoscapine-induced mitotic arrest of cigarette smoke condensate-transformed breast epithelial cells. **J. Cell. Biochem.** 106: 1146-1156, 2009.
33. Kannan A, Hettiarachchy N, **Narayan S.** Colon and breast anti-cancer effects of peptide hydrolysates derived from rice bran. **The Open Bioactive Compounds Journal** 2: 17-20, 2009.
34. Panda H, Jaiswal AS, Corsino PE, Armas ML, Law BK, **Narayan S.** Amino acid Asp181 of 5'-flap endonuclease 1 is a useful target for chemotherapeutic development. **Biochemistry** 48: 9952-9958, 2009.
35. Jaiswal AS, Banerjee S, Panda H, Bulkin CD, Izumi T, Sarkar FH, Ostrov DA, **Narayan S.** A novel inhibitor of DNA polymerase beta enhances the ability of temozolomide to impair the growth of colon cancer cells. **Mol. Cancer Res.** 7: 1973-1983, 2009.

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36. Karna P, Zughaier S, Pannu V, Simmons R, **Narayan S,** Aneja R. Induction of reactive oxygen species (ROS)-mediated autophagy by a novel microtubule-modulating agent. **J. Biol. Chem. 285:** 18737-18748, 2010.
37. Jaiswal AS, Banerjee S, Aneja R, Sarkar FH, Ostrov DA, **Narayan S.** DNA polymerase β as a novel target for chemotherapeutic intervention of colorectal cancer. **PLoS ONE** 6: e16691, 2011.
38. Jaiswal AS, **Narayan S.** Assembly of base excision repair complex on abasic DNA and role of adenomatous polyposis coli in its functional activity. **Biochemistry** 50: 1901-1909, 2011.
39. Karna P, Gundala SR, Gupta MV, Shamsi SA, Pace, Yates C, **Narayan S,** Aneja R. Polyphenol-rich sweet potato greens extract inhibits proliferation and induces apoptosis in prostate cancer cells *in vitro* and *in vivo*. **Carcinogenesis** 32: 1872-1880, 2011.
40. Jaiswal AS*, Armas ML*, Tadahide I, Strauss PR, **Narayan S.** Adenomatous polyposis coli interacts with flap endonuclease 1 to block its nuclear entry and function. **Neoplasia** 14: 495-508, 2012.
*Equal contribution
41. Jaiswal AS, Panda H, Pampo C, Siemann DW, Gairola CG, Hromas R, **Narayan S**. Adenomatous polyposis coli-mediated accumulation of abasic DNA lesions lead to cigarette smoke condensate-induced neoplastic transformation of normal breast epithelial cells. **Neoplasia** 15: 454-460, 2013.
42. Jaiswal AS, Hirsch-Wei D, Proulx ER, Hong S, **Narayan S.** Anti-tumor activity of novel biisoquinoline derivatives against triple-negative breast cancers. **Bioorg. Med. Chem. Lett.** 24: 4850-4853, 2014.
43. Jaiswal AS, Panda H, Law BK, Sharma J, Jani J, Hromas R, **Narayan S.** Small molecules inhibit strand-displacement activity of DNA polymerase β and potentiate temozolomide-induced DNA damage, senescence and apoptosis in colorectal cancer cells. **PLoS ONE** 10: e0123808, 2015.
44. Law ME, Corsino PE, **Narayan S,** Law BK. Cyclin-Dependent Kinase Inhibitors as Anticancer Therapeutics. **Mol. Pharmacol.** 88: 846-852, 2015.

Note: This article was selected as one of the journal highlights that was posted on the ASPET website (www.aspet.org). The paper was also announced on Twitter (Mol. Pharm. (ASPET) @MolPharmJournal) and announced on Molecular Pharmacology's Facebook page (www.facebook.com/molpharmaspetjournal)

45. **Narayan S,** Sharma R. Molecular mechanism of adenomatous polyposis coli (APC)-induced blockage of base excision repair pathway in colorectal carcinogenesis. **Life Sci.** 139: 145-152, 2015.
46. **Narayan S,** Jaiswal AS, Law BK, Kamal MA, Sharma AK, Hromas RA. Interaction between APC and Fen1 during breast carcinogenesis. **DNA Repair** 41: 52-56, 2016.
47. **Narayan S,** Jaiswal AS, Sharma R, Nawab A, Duckworth LV, Law BK, Kaye-Zajac M, George, TJ, Jr., Sharma J , Sharma AK, Hromas RA. NSC30049 inhibits Chk1 pathway in 5-FU-resistant CRC bulk and stem cell populations. **Oncotarget** 8: 57246-57264, 1017.
48. Das S, Nayak A, Siddharth S, Nayak D, **Narayan S,** Kundu. TRAIL enhances Quinacrine-mediated apoptosis in breast cancer cells through induction of autophagy via modulation of p21 and DR5 interaction. **Cell. Oncol.** 40: 593-607, 2017.
49. Ramisetti SR, Pandey MK, Lee SY, Karelia D, **Narayan S,** Amin S, Sharma AK. Design and synthesis of novel thiobarbituric acid derivatives targeting both wild-type and BRAF-mutated melanoma cells. **Eur. J. Med. Chem.** 143:1919-1930, 2018.

Curriculum Vitae

John P. Aris, PhD
Department of Anatomy and Cell Biology Gainesville, FL 32610-0235
1333 Center Drive, Rm B1-8
University of Florida
Gainesville, FL 32610-0235
johnaris@ufl.edu
352-273-6868

Academic Positions
1999- Associate Professor, Department of Anatomy and Cell Biology, UF
1991-99 Assistant Professor, Department of Anatomy and Cell Biology, UF

Administrative Positions
2017- Director for Pre-clerkship Curriculum, College of Medicine, UF
2009- Program Director for Education, Department of Anatomy and Cell Biology, UF

Postdoctoral Training
1988-91 Research Associate, HHMI, Rockefeller University, NY, NY, Advisor: Günter Blobel
1985-88 Postdoctoral Fellow, Rockefeller University, NY, NY, Advisor: Günter Blobel

Education
1985 PhD, Biological Sciences, Stanford University, Stanford, CA, Advisor: Robert D. Simoni
1979 BS, Chemistry & Biology, Jacksonville University, Jacksonville, FL

Honors and Fellowships
2006-17 Exemplary Teacher Award, College of Medicine, UF
1992 New Investigator Award, Division of Sponsored Research, UF
1985 NRSA Postdoctoral Fellowship Award, National Institutes of Health
1980 Predoctoral Fellowship Award, National Science Foundation
1979 Annual Biology Major Award, Jacksonville University
1978 Annual Chemistry Major Award, Jacksonville University
1978 Phi Kappa Phi Honor Society Membership, Jacksonville University

Teaching (current courses directed)

Term	Course	Role
Fall	Foundations of Medicine	Director for 12-week course for first year MD students
Spring	Histology	Director for 8-week course for first year DMD students
	Protein Trafficking	Director for 5-week advanced course for PhD students
	Mechanisms of Aging	Director for 5-week advanced course for PhD students
	Human Histology	Director for 15-week course for undergraduate students

National Service
2013-16 USMLE Step 1 Physiology and Cell Biology TMDC meeting, NBME
2012 US Medical Licensing Examination (USMLE) Step 1 Test Material Development Committee (TMDC) workshop, National Board of Medical Examiners (NBME)

University Service
2017 Judge, Graduate Student Research Day Poster Session
2015 Member, Provost's Task Force on College of Medicine Undergraduate Courses
2013-14 University Curriculum Committee, COM Representative

College Service
2017- Reviewer, Applicants, Summer Health Professions Education Program (SHPEP)
2017- Member, Evaluation Subcommittee (reports to Curriculum Committee)
2017 Mentor, Small Group Mentoring Program (for first year Graduate Students)
2017 Judge, Graduate Student Education Initiative Award
2015- Member, ICBR Monoclonal Antibody Core Laboratory Advisory Group
2014-15 Member, Admissions Committee, Interdisciplinary PhD (IDP) Program
2014-15 Co-Director, Molecular Cell Biology (MCB) Concentration, IDP
2013-15 Judge, Graduate Student Research Competition, MCB Concentration
2012-17 Member, Course Directors Committee, College of Medicine
2011-17 Interviewer (ad hoc), Admissions Committee, IDP
2012 Judge, Medical Guild Graduate Student Research Competition, IDP
2011-12 Member, Curriculum Design Committee, College of Medicine
2010 Member, Search Committee, Director of School of Physicians Assistant Studies
2010 Judge, Graduate Student Research Competition, MCB Concentration
2009-12 Member, Medical Student Admissions Committee, College of Medicine
2008 Judge, Graduate Student Research Competition, MCB Concentration
1999-00 Faculty Council, College of Medicine, Departmental Representative
1999-00 Member, Admissions Committee, IDP
1995 Judge, Medical Guild Graduate Student Research Competition, IDP
1995-8 Member, Selection Committee, Joseph and Leila Applebaum Visiting Professorship
1995-6 Member, Core Curriculum Design Committee, IDP
1995-6 Member, Advisory Board, Associate Dean for Graduate Education

Department Service
2016- Member, New Degree Program Committee (online MS and PhD in Anatomy Education)
2015-17 Member, Search Committee, Associate or Full Professor (Education, Non-tenure track)
2015 Member, Search Committee, Assistant Professor (Research, Non-tenure track)
2013-14 Chair, Search Committee, Any Rank (Research, Tenure track)
2013-14 Chair, Search Committee, Assistant Scientist (Research, Non-tenure track)
2005-17 Organizer, Departmental Retreat
2009 Chair, Search Committee, Lecturer (Education, Non-tenure track)
1994-5 Member, Search Committee, Chair, Department of Anatomy and Cell Biology
1992-5 Member, Graduate Admissions Committee

Grant Support
2005-07 PI, NIH R21, Regulation of Yeast Life Span, $327,375 (total)
2002-03 PI, Ellison Medical Foundation, Extrachromosomal rDNA Circles: More Than Episomes with Origins, $25,000 (total)
2000-02 PI, American Cancer Society, Florida Division, Nucleolar Function and Cell Growth in Yeast, $25,000 (total)
1994-99 PI, NIH R01, Nucleolar Function and Cell Growth in Yeast, $823,172 (total)

1994-98 Co-PI (10% effort) NIH R01, G. S. Bennett, PI, Neurofilament Metabolism in Embryonic and Mature Neurons, $780,806 (total)

Grant Review
2012 Rhode Island Research Alliance, AAAS Research Competitiveness Program (ad hoc)
2010 Qatar National Research Fund (ad hoc)
2010 American Geriatrics Society Foundation Research Scholar Award (ad hoc)
2009 US Civilian Research & Development Foundation (ad hoc)
2008 ETH Zurich Research Commission (ad hoc)
2005, 07 National Science Foundation (ad hoc)
2005-06 American Heart Association (ad hoc)
1997-01 American Cancer Society (ad hoc)

Journal Review (57 reviews)
Aging Cell, Autophagy, EMBO J, Experimental Gerontology, FEMS Yeast Research, J Biological Chemistry, J Cellular Biochemistry, J Cell Biology, J Cell Science, J Eukaryotic Microbiology, J Molecular Biology, Medical Science Educator, Molecular and Cellular Biology, Molecular Biology of the Cell, Nucleic Acids Research, PLoS Genetics, PLoS ONE, Rejuvenation Research, Yeast

Meeting / Abstract Review
International Association of Medical Science Educators, Posters, Annual Meeting 2012

Faculty Mentoring
2005-15 Mentor, 1-2 tenure-track and 2-3 non-tenure track faculty members annually

PhD Committees (listed by graduation date)
Chair or Co-chair
2010 Arnold Seo, Department of Aging and Geriatric Research (co-chair)
2004 Alaric Falcón, Department of Anatomy and Cell Biology
2003 J. Michael Thomson, Department of Anatomy and Cell Biology (co-chair)
1998 Pei Wu, Department of Anatomy and Cell Biology
1997 Bo Hong, Department of Anatomy and Cell Biology
Member (39 students)
John Calaise, Department of Oral Biology
Emily Brown, Department of Ophthalmology
Rola Zeidan, Department of Physiological Sciences
2017 Allyson Shea, Department of Anatomy and Cell Biology
2017 William Godwin, Department of Biomedical Engineering
2016 Bryan Schwarz, Department of Biomedical Engineering
2016 Daniel Shabashvili, Department of Anatomy and Cell Biology
2015 Amy Geyer, Department of Biomedical Engineering
2015 Apoorva Mohan, Department of Molecular Genetics and Microbiology
2014 Patrick Thiaville, Department of Microbiology and Cell Science
2013 Jaclyn Hayner, Department of Biochemistry and Molecular Biology
2013 Daniel Long, Department of Biomedical Engineering
2013 Matthew R. Maynard, Department of Nuclear and Radiological Engineering
2012 Debapriya Dutta, Department of Aging and Geriatric Research

2011 Daein Kim, Department of Anatomy and Cell Biology
2010 Santhi Pondugula, Department of Biochemistry and Molecular Biology
2010 Judy Hwang, Department of Aging and Geriatric Research (left program)
2009 John Domsic, Department of Biochemistry and Molecular Biology
2009 Deanna H. Pafundi, Department of Nuclear and Radiological Engineering
2009 Qian Liu, Department of Anatomy and Cell Biology
2008 Santiago Aleixo, Department of Anatomy and Cell Biology
2008 Shane Claggett, Department of Biochemistry and Molecular Biology
2007 Melissa Crisp, Department of Anatomy and Cell Biology
2007 Yuan Yuan, Department of Molecular Genetics and Microbiology
2007 Laura A. Schroder, Department of Anatomy and Cell Biology
2006 Cuong Nguyen, Department of Pathology, Immunology, and Laboratory Medicine
2005 Slim Sassi, Department of Chemistry
2005 Lee Kaplan, Department of Molecular Genetics and Microbiology
2001 Vivian Fincher, Department of Horticultural Sciences
2001 Lisa M. Curtis, Department of Anatomy and Cell Biology
2000 Kristin L. Moon, Department of Molecular Genetics and Microbiology
1999 Pierre-Yves Musy, Department of Molecular Genetics and Microbiology
1999 James L. Gardner, Department of Biochemistry and Molecular Biology
1998 Weiping Yuan, Department of Anatomy and Cell Biology
1998 Jill W. Miller, Department of Molecular Genetics and Microbiology
1997 Mary C. Bowman, Department of Molecular Genetics and Microbiology
1996 Carolyn M. Drazinic, Department of Molecular Genetics and Microbiology
1996 Lucia F. Aleixo, Department of Pathology and Laboratory Medicine
1995 James T. Anderson, Department of Molecular Genetics and Microbiology

MS Committees (listed by graduation date)
Member
2010 Nelia Sanchez-Monreal Long, Department of Nuclear and Radiological Engineering
2009 Matthew R. Maynard, Department of Nuclear and Radiological Engineering
2002 Tina Chang, Department of Anatomy and Cell Biology

Postdoctoral Research Supervision
1997-00 Ke Wu
1993-97 J. Scott Brockenbrough
1993-94 Shaoping Chen
1992-93 Andrea Hofig

Technician Research Supervision
2005-08 Michael Wood
1997-98 Julie Wan-Young

Undergraduate Research Supervision (with postgraduate education after UF)
2013 Michael Leonard PhD Student, UCLA
2013 Amanda Hanvivatpong, Honor Student
2013 Veronica Swanberg, Honor Student
2012 Kyle Losin, Honor Student DDS student, UF

2010 Roy Ferraiuolo, Honor Student with Thesis MD student, UF
2010 Bonnie Vu, Honor Student with Thesis
2010 Michelle Maraffini, Honor Student with Thesis PhD student, Cal State
2010 Laura Fishwick, Honor Student with Thesis JD student, Harvard
2008 Doreen Hu PA student, Arcadia Univ
2007 Amelia Kaywell, Honor Student with Thesis MD student, UF
2007 Christine Kirlew, Honor Student MD student, Vanderbilt
2007 Jennifer Westcott DDS, UF
2004 Natalie Rios, University Scholar, Honor Student with Thesis PhD, UNC Chapel Hill
2004 Diego Ayo, Honor Student MD, NYU
2003 Joan M. González, NIH Short-term Research Training for
Minority Students Program
2002 Fernando Castro, University Scholar, Honor Student MD, UF
2000 Catherine Avery-Jones, Honor Student with Thesis
2000 Dana Sacco, Honor Student with Thesis MD, Washington Univ
1999 Catherine Roberts, NIH Short-term Research Training for
Minority Students Program
1998 Jennifer Dawe, Exchange Student, University of Bath, UK
1997 Angela Mecalfe, Exchange Student, University of Bath, UK
1995 Joanne Dove, Honor Student with Thesis PhD, Berkeley
1994 Vishal Gupta, Honor Student with Thesis MD, UF
1993 Ralph Doerner, Honor Student with Thesis PA, UCF

Medical Student Research Advisement
2013 Tene Sablo, Medical Student Research Program (co-mentor)
2013 Ella Uwaibi, Medical Student Research Program (co-mentor)
5
2011 Michael Armbruster, Medical Student Research Program

Professional Societies
American Association for the Advancement of Science, American Society for Cell Biology, International Association of Medical Science Educators

Patents
1998 Monoclonal antibody to nucleolar protein, patent number 5811247
1994 Human fibrillarin nucleic acid sequence, patent number 5310892

Publications (in chronological order, asterisk denotes corresponding author)
1. **Aris,* JP**, AD Eisemann, and L Moulton. 1982. The occurrence of Pugettia richii (Crustacea: Decapoda) on Cystoseira osmundacea follows a diel pattern. Bulletin Marine Sci 32:243-249.
2. **Aris, JP**, and RD Simoni.* 1983. Cross-linking and labeling of the Escherichia coli F1Fo-ATP synthase reveal a compact hydrophilic portion of Fo close to an F1 catalytic subunit. J Biol Chem 258:14599-14609.
3. **Aris, JP**, DJ Klionsky, and RD Simoni.* 1985. The Fo subunits of the Escherichia coli F1Fo-ATP
synthase are sufficient to form a functional proton pore. J Biol Chem 260:11207-11215.
4. **Aris, JP**, and RD Simoni.* 1985. The ß subunit of the Escherichia coli ATP synthase exhibits a

tight membrane binding property. Biochem Biophys Res Commun 128:155-162.
5. **Aris, JP**, and G Blobel.* 1988. Identification and characterization of a yeast nucleolar protein that
is similar to a rat liver nucleolar protein. J Cell Biol 107:17-31.
6. **Aris, JP**, and G Blobel.* 1989. Yeast nuclear envelope proteins cross react with an antibody against mammalian pore complex proteins. J Cell Biol 108:2059-2067.
7. Henríquez, R, G Blobel, and **JP Aris**.* 1990. Isolation and sequencing of NOP1: a yeast gene encoding a nucleolar protein homologous to a human autoimmune antigen. J Biol Chem 265:2209-2215.
8. **Aris, JP**, and G Blobel.* 1991. The isolation of yeast nuclei. Methods Enzymol (Guthrie & Fink, eds) 194:735-749.
9. **Aris, JP**, and G Blobel.* 1991. cDNA cloning and sequencing of human fibrillarin, a conserved nucleolar protein recognized by autoimmune antisera. Proc Natl Acad Sci USA 88:931-935.
10. **Aris, JP**, PV Basta, WD Holmes, LM Ballas, C Moomaw, NB Rankl, G Blobel, CR Loomis, and D
J. Burns.* 1993. Molecular and biochemical characterization of a recombinant human PKC-delta family member. Biochim Biophys Acta 1174:171-181.
11. Monestier,* M, MJ Losman, KE Novick, and **JP Aris**. 1994. Molecular analysis of mercuryinduced
anti-nucleolar antibodies in H-2S mice. J Immunol 151:667-75.
12. deBeus, E, JS Brockenbrough, B Hong, and **JP Aris**.* 1994. Yeast NOP2 encodes an essential nucleolar protein with homology to a human proliferation marker. J Cell Biol 127:1799-1813.
13. Hong, B., JS Brockenbrough, P Wu, and **JP Aris**.* 1997. Nop2p is required for pre-rRNA processing and 60S ribosome subunit synthesis in yeast. Mol Cell Biol 17:378-388.
14. Zimowska, G, **JP Aris**, and MR Paddy.* 1997. A Drosophila Tpr protein homolog is localized both in the extrachromosomal channel network and to nuclear pore complexes. J Cell Sci 110:927-944.
15. Chen, S, JE Dove, JS Brockenbrough, and **JP Aris**.* 1997. Homocitrate synthase is located in the nucleus in the yeast Saccharomyces cerevisiae. J Biol Chem 272:10839-10846.
16. Dove, JE, JS Brockenbrough, and **JP Aris**.* 1998. Isolation of nuclei and nucleoli from the yeast
Saccharomyces cerevisiae. (M. Berrios, ed) Methods Cell Biol 53:33-46.
17. Wu, P, JS Brockenbrough, A Metcalfe, S Chen, and **JP Aris**.* 1998. Nop5p is a small nucleolar ribonucleoprotein component required for pre-18S rRNA processing in yeast. J Biol Chem 273:16453-63.
18. Wu, P, JS Brockenbrough, MR Paddy, and **JP Aris**.* 1998. NCL1, a novel gene for a nonessential
nuclear protein in Saccharomyces cerevisiae. Gene 220:109-117.
19. Oakes, ML, **JP Aris**, JS Brockenbrough, H Wai, L Vu, and M Nomura.* 1998. Mutational analysis
of the structure and localization of the nucleolus in the yeast Saccharomyces cerevisiae. J Cell Biol 143:23-34.
20. Tolerico, LH, AL Benko, **JP Aris**, DR Stanford, NC Martin, and AK Hopper.* 1999. Saccharomyces cerevisiae Mod5p-II contains sequences antagonistic for nuclear and cytosolic locations. Genetics 151:57-75.
21. Oakes, ML, I Siddiqi, L Vu, **JP Aris**, and M Nomura.* 1999. Transcription factor UAF, expansion

and contraction of ribosomal DNA (rDNA) repeats, and RNA polymerase switch in transcription of yeast rDNA. Mol Cell Biol 19:8559-8569.
22. Wu, K, JH Dawe, **JP Aris**.* 2000. Expression and subcellular localization of a membrane protein
related to Hsp30p in Saccharomyces cerevisiae. Biochim Biophys Acta 1463:477-482.
23. Nelson, SA, **JP Aris**, BKR Patel, and WJ LaRochelle.* 2000. Multiple growth factor transcriptional activation of SAN5, a murine early response gene that complements a lethal defect in yeast ribosome biogenesis. J Biol Chem 275:13835–13841.
24. Fahrenkrog, B, **JP Aris**, EC Hurt, N Pante, and U Aebi.* 2000. Comparative spatial localization of protein-A-tagged and authentic yeast nuclear pore complex proteins by immunogold electron microscopy. J. Struct Biol 129:295-305.
25. Hong, B, K Wu, JS Brockenbrough, P Wu, and **JP Aris**.* 2001. Temperature sensitive nop2 alleles defective in synthesis of 25S rRNA and large ribosomal subunits in Saccharomyces cerevisiae. Nucleic Acids Res 29:2927-37.
26. Wu, K, P Wu, and **JP Aris**.* 2001. Nucleolar protein Nop12p participates in synthesis of 25S rRNA in Saccharomyces cerevisiae. Nucleic Acids Res 29:2938-49.
27. Lu, M, S Vergara, L Zhang, LS Holliday, **JP Aris**, and SL Gluck.* 2002. The amino-terminal domain of the E subunit of V-ATPase interacts with the H subunit and is required for V-ATPase function. J Biol Chem 277:38409-15.
28. Falcón, AA, and **JP Aris**.* 2003. Plasmid accumulation reduces life span in Saccharomyces cerevisiae. J Biol Chem 278:41607-41617.
29. Thomson, JM, EA Gaucher, MF Burgan, D DeKee, T. Li, **JP Aris**, and SA Benner.* 2005. Resurrecting ancestral alcohol dehydrogenases from yeast. Nat Genet 37:630-635.
30. Falcon, AA, N Rios, and **JP Aris**.* 2005. 2-micron circle plasmids do not reduce yeast life span. FEMS Microbiol Let 250:245–251.
31. Oakes, ML, I Siddiqi, SL French, L Vu, M Sato, **JP Aris**, AL Beyer, and M Nomura*. 2006. Role of histone deacetylase Rpd3 in regulating rDNA transcription and nucleolar structure in yeast. Mol Cell Biol 26:3889–3901.
32. Urbinati, CR, GB Gonsalvez, **JP Aris** and RM Long.* 2006. Loc1p is required for efficient assembly and nuclear export of the 60S ribosomal subunit. Mol Genet Genomics 276:369-377.
33. Swanson*, MS, and **JP Aris**. 2008. Post-transcriptional control: nuclear RNA processing. In Inborn Errors of Development, 2nd Edition, C. J. Epstein, R. P. Erickson, and A. Wynshaw-Boris, Eds. Oxford University Press. Oxford, UK, pp 1108-1125.
34. Bhabhra, R, DL Richie, HS Kim, WC Nierman, J Fortwendel, **JP Aris**, JC Rhodes, and DS Askew.* 2008. Impaired ribosome biogenesis disrupts integration between morphogenesis and nuclear duplication during the germination of Aspergillus fumigatus. Eukaryotic Cell 7:575-583.
35. Pafundi, D, C Lee, . Watchman, V Bourke, **J Aris**, N Shagina, J Harrison, T Fell, and W Bolch.* An image-based skeletal tissue model for the ICRP reference newborn. 2009. Phys Med Biol 54:4497-531.
36. Alvers, AL, LK Fishwick, MS Wood, D Hu, HS Chung, WA Dunn Jr, and **JP Aris**.* 2009. Autophagy and amino acid homeostasis are required for chronological longevity in Saccharomyces cerevisiae. Aging Cell 8:353-369.
37. Alvers, AL, MS Wood, D Hu, AC Kaywell, WA Dunn Jr, and **JP Aris**.* 2009. Autophagy is required for extension of yeast chronological life span by rapamycin. Autophagy 5:847-9.
38. Falcon, AA, S Chen, MS Wood, and **JP Aris**.* 2010. Acetyl-coenzyme A synthetase 2 is a nuclear protein required for replicative longevity in Saccharomyces cerevisiae. Mol Cell Biochem 333:99-108.

39. **Aris**,* JP, MC Elios, E Bimstein, SM Wallet, S Cha, KN Lakshmyya, and J Katz.* 2010. Gingival
RAGE expression in calorie restricted versus ad libitum fed rats. J Periodontology 81:1481-7.
40. Seo, AY, A-M Joseph, D Dutta, JCY Hwang, **JP Aris***, C Leeuwenburgh. 2010. New insights into
the role of mitochondria in aging: mitochondrial dynamics and more. J Cell Sci 123:2533-42.
41. Maynard, MR, JW Geyer, **JP Aris**, RY Shifrin, W Bolch.* 2011. The UF family of hybrid phantoms of the developing human fetus for computational radiation dosimetry. Phys Med Biol 56:4839-4879.
42. **Aris**,* JP, LK Fishwick, ML Marraffini, AY Seo, C Leeuwenburgh, and WA Dunn Jr. 2012. Amino
acid homeostasis and chronological longevity in Saccharomyces cerevisiae. In Aging Research in Yeast. M Brietenbach, P Laun, SM Jazwinski, Eds. Springer, NY. Subcell Biochem. 57:161-86.
43. **Aris**,* JP, AL Alvers, RA Ferraiuolo, LK Fishwick, A Hanvivatpong, D Hu, C Kirlew, MT Leonard, KJ Losin, M Marraffini, AY Seo, V Swanberg, JL Westcott, MS Wood, C Leeuwenburgh, and WA Dunn Jr. 2013. Autophagy and leucine promote chronological longevity and respiration proficiency during calorie restriction in yeast. Experimental Gerontology 48:1107-1119.
44. Dunn Jr,* WA, LA Schroder, **JP Aris**. 2013. Historical overview of autophagy. Autophagy and Cancer, Current Cancer Research (vol 8), H-G Wang, Ed, Springer, NY.
45. Torres-Machorro AL, **JP Aris**, L Pillus.* 2015. A moonlighting metabolic protein influences repair at DNA double-stranded breaks. Nucleic Acids Res. 43:1646-58

College of Education

CURRICULUM VITAE

Ester Johanna de Jong, Ed.D.
Professor
2423 Norman Hall
Gainesville, FL 32611 352-273 4227
edejong@coe.ufl.edu
https://education.ufl.edu/faculty/de-jong-ester/

EDUCATION

Tilburg University	Tilburg, Netherlands	Language and Literature Studies Major: Minority Languages	BA.MA, 1990
Boston University	Boston, MA	Literacy, Language and Cultural Studies Specialization: Bilingual Education	EdD, 1997

EMPLOYMENT

2014- present	Professor, ESOL/Bilingual Education, University of Florida Director, School of Teaching and Learning, College of Education, University of Florida
2007 – 2014	Associate Professor, ESOL/Bilingual Education, University of Florida.
2001 –2007	Assistant Professor, ESOL/Bilingual Education, University of Florida.
Spring 2001	Lecturer, Harvard University, Cambridge, MA
Fall 2000	Lecturer, Simmons College, MA

TEACHING EXPERIENCE

University of Florida Graduate online courses2011 – present
University of FloridaUndergraduate/Graduate (MA and PhD)
Face-to-Face courses 2001-present

AWARDS

2013 Award for Excellence in Research on Bilingual Education (ATDLE)
2012 B.O. Smith Research Professor (2012-2015)

GRANTS

Funded Externally

Coady, M., de Jong, E.J., & Harper, C. (2016-2021). *Project STELLAR: Supporting Teachers of English Language Learners Across Rural Settings*. US Department of Education, Office of English Language Acquisition, ($2,394,991)

de Jong, E.J., & Colvin, S. (2014-2017). *Project ADePT: Advancing the Development of Preservice Teachers.* Center for Excellence in Elementary Teacher Preparation. Florida Department of

Education. ($2,718,695).

de Jong, E.J. (August 2009-2010). Principal Investigator. *Equity in education: Scaffolding for peer interaction in linguistically heterogeneous classrooms.* ($40,000). Spencer Foundation.

de Jong., E.J., Coady, M., & Harper (July 2007 – July 2012). Principal Investigator. *Developing English Language and Literacy through Teacher Achievement (Project DELTA)*. ($1,107,771). Funding agency: U.S. Department of Education. Project #T195N070016.

Funded Internally

de Jong, E.J. (May 2012 – May 2015). *Academic language in two-way immersion.* ($24,000). Funding Agency: B.O. Smith Professor, College of Education.

de Jong, E.J. (May 2011-May 2012). Academic language input in linguistically diverse classrooms. ($8,000). Funding Agency: The UF College of Education Research Incentive Fund. Project #00077138.

de Jong, E.J., (August 2009-August 2010). *Multilingualism research project*. ($20,000). Funding Source: UF Faculty Enhancement Opportunity fund.

de Jong, E.J. (May 2006- May 2007). Principal Investigator. *Student and teacher experiences in a secondary two-way immersion program* ($3,000). Funding agency: The UF College of Education Research Incentive Fund.

SELECED PUBLICATIONS (Since 2010)

Books, Sole Author

de Jong, E.J. (2011). *Foundations for Multilingualism in Education: From Principles to Practice*. Philadelphia, PA: Caslon Inc.

Books, Contributor of Chapters

Refereed

de Jong, E.J. (2012). Teacher discourse and peer interaction in linguistically diverse classrooms. In: Bogum, Y. & Kim, H. (Eds.), *Teachers' Roles in Second Language Learning: Classroom Applications of Sociocultural Theory*. (pp. 191-212). Charlotte, NC: Information Age Publishing.

de Jong, E.J., & Bearse, C. (2011) The same outcomes for all? High school students reflect on their two-way immersion program experiences. In: Christian, D., Tedick, D., & Fortune, T. (Eds.), *Immersion Education: Pathways to bilingualism and beyond*. (104-122). Clevedon, United Kingdom: Multilingual Matters.

Invited

de Jong, E.J., & Yilmaz, T. (2017). Examining Components of School Districts with High Expectations for ELs' Academic Success. In M. Daniel (Ed.), *Culture, Language, and Curricular Choices: What Teachers Want to Know about Planning Instruction for English Learners.* Rowman & Littlefield.

Brisk, M.E., de Jong, E.J., & Moore, M. C. (2015). Primary bilingual education: Pedagogical issues and practices. In W. Wright, S.Boun, & O. García (Eds.), *Handbook of Bilingual and Multilingual Education*. West Sussex, UK: Wiley-Blackwell.

de Jong, E.J., & Barko Alva, K. (2015). Mainstream Teachers in Two-Way Immersion Programs: Becoming Content and Language Teachers. In Y. Freeman & D. Freeman (Eds). *Research on Preparing Inservice Teachers to Work Effectively with Emergent Bilinguals*. Advances in Teaching Volume 24. (pp. 107-126). Bingley, UK: Emerald Insights.

Torres-Guzmán, M. E., & de Jong, E.J. (2015). Looking Back, Sideways, and Forward: Language and Education in Multilingual Settings. In: M. Bigelow & J. Ennser-Kananen (Eds.), *The Routledge Handbook of Educational Linguistics*. (pp. 428-445). New York: Routledge.

de Jong, E.J. (2012). Two-way immersion education. In Banks, J. (Ed.). *Encyclopedia of Diversity in Education* (2202-2207). New York: Sage Publications.

de Jong, E.J. (2012). Multilingual education in North America. Chapelle, C. (Ed.), *The Encyclopedia of Applied Linguistics* (pp. 3834-3841). Malden, MA: Blackwell.

de Jong, E.J. (2010). From models to principles: Implementing quality schooling for ELLs. In Li, G., & Edwards, P. (Eds.), *Best practices for ELLs*. (189-206). New York: Guilford Press.

de Jong, E.J., Arias, B., & Sánchez, M.T. (2010). Undermining teacher competencies: Another look at the impact of restrictive language policies. Gándara, P., & Hopkins, M. (Eds.), *Forbidden Language: English Learners and Restrictive Language Policies*. (pp. 118-138). New York: Teachers College Press.

de Jong, E.J., & Freeman, R. (2010). Bilingual approaches. Leung, C. and Creese, A. (Eds.) *English as an Additional Language: Approaches to Teaching Linguistic Minority Students. (pp.*108 – 122) London: SAGE.

Refereed Publications

de Jong, E.J., Li, Z., Zafar, A., & Wu, C. (2016). Language policy in multilingual contexts: Revisiting Ruiz's "language-as-resource" orientation. *Bilingual Research Journal, 39* (3-4), 200-212.

de Jong, E.J. (2016) Two-Way Immersion for the Next Generation: Models, Policies, and Principles, *International Multilingual Research Journal*, *10* (1), 6-16.

Coady, M. R., Harper, C.A., & de Jong. E.J., (2016). Aiming for equity: Preparing mainstream teachers for inclusion or inclusive classrooms? *TESOL Quarterly, 50* (2), 340-368.

de Jong, E.J. (2014). Program design and two-way immersion programs. *Journal of Immersion and Content-Based Language Education, 2*(2),241-256.

de Jong, E.J. (2013). Preparing mainstream teachers for multilingual classrooms, *Association of*

Mexican American Educators Journal, 7(2), 40-49.

de Jong, E.J. (2013). Policy discourses and U.S. language in education policies. *Peabody Journal of Education*, 88 (1), 98-111.

de Jong, E.J., Harper, C.A., & Coady, M. (2013). Enhanced knowledge and skills for elementary mainstream teachers of English language learners. *Theory into Practice, 52* (2), 89-97.

de Jong, E.J., & Bearse, C.I. (2012). Dual Language programs as a strand within a secondary school: Dilemmas of school organization and the TWI mission. *International Journal of Bilingual Education and Bilingualism, 1-17*.

Coady, M., de Jong, E. J.,& Harper, C. A. (2011). Preservice to practice: Mainstream teacher beliefs of preparation and efficacy with English language learners in the state of Florida. *Bilingual Research Journal 34*(2), 223-239.

Dubetz, N., & de Jong, E.J. (2011). Teacher advocacy in bilingual programs. *Bilingual Research Journal*, 34 (3), 248-262.

CURRICULUM VITAE

Kara Dawson
Professor, Educational Technology

EDUCATION

University of Virginia	Instructional Technology	Ph.D. 1997
Edinboro University of Pennsylvania	Elementary Education Manipulative Mathematics	M.S. 1992
Edinboro of Pennsylvania	Elementary Education	B.S. 1991

EMPLOYMENT

University of Florida	Professor	2013-present
University of Florida	Associate Professor	2005-present
University of Florida	Assistant Professor (tenure-accruing)	1999-2005
University of Virginia	Post-doctoral position Coordinator, Center for Technology and Teacher Education	1997-1999
University of Virginia	University Computing Center	1995-1997

TEACHING EXPERIENCE

University of Florida	Graduate Online Courses	2005-present
University of Florida	Undergraduate/Graduate Face-to-Face Courses	1999-present
Virginia Beach City Public Schools	Larkspur Middle School	1994-1995
Virginia Beach Public Schools	Kempsville Meadows Elementary School	1992-1994

Edinboro University of Pennsylvania	Graduate Assistant/Teacher Miller Research Center Computer resource teacher	1991-1992

AWARDS

2015-2108 Irving and Rose Fien Professorship

2013-2016 University of Florida Research Professorship

2013-2014 University of Florida Graduate Mentoring and Advising Award

2011 College of Education Scholarship of Engagement Award

2009 University of Florida Faculty Enhancement Opportunity

2008 B.O. Professorship Award for Associate Professors

2008 Outstanding Paper Award - Society for Information Technology and Teacher Education

Nominee for 2008 AERA SIG-TACTL Research Paper Award

Nominee for 2007 Florida Distinguished Research Paper Award

2007 CITE/JTATE Technology Leadership Award (Honorable Mention): Exemplary Use of Technology to Teach Content in a Teacher Education Methods Course

Nominee for 2006 Graduate Faculty Teaching Award

GRANTS

Antonenko, P., Dawson, . & Fang, Z. (2014) Enriching Cross-Program and Cross-University Collaboration: Using Eye Tracking to Study Dyslexia and Technology at the Visual Learning Lab, UMass Boston. STL IDC Competition. $5000.

Dawson, K., Antonenko, P., Lombardino, L., Ritzhaupt, A., Beal, C. & Keil, A. (2014). Converging Behavioral and Psychophysiological Measures: Evaluating the Effectiveness of Multimedia Learning Conditions with Dyslexic Learners. University of Florida Research Opportunity Fund. $94,458.

Senior Project Personnel for Antonenko, P., Schneps, M. & Lamb, R. *SL-CN: Project LENS: Leveraging Expertise in Neurotechnologies to Study Individual Differences in Multimedia Learning*. NSF Science of Learning: Collaborative Networks. $750,000.

Dawson, K., Cavanaugh, C. & Ritzhaupt, A. (2010). *The Florida Digital Educator Program: Research and Evaluation of the Title II-D Competitive Enhancing Education through Technology Funds.* Florida Department of Education, $1,009,495.43.

Cavanaugh, C. & Dawson, K. (2010). *Online Medical Education Degree (OnMED): Andragogic*

Skills for 21st Century Clinical Medical Educators. Fund for the Improvement of Postsecondary Education (FIPSE)/USDOE. $299,342.

Dawson, K. & Cavanaugh, C. *Exploring science content: Digital strategies for science teaching and learning*. Role: Co-Principal Investigator. Funding Agency: Florida Department of Education, Math/ Science Partnership Grants. Funded for July 2007- August 2008. Total funding amount: $127,487.00

Hayes, L., Young, D. & Dawson, K. *PKY Classrooms of the Future, Today*. Florida Department of Education. $749,999.

Thompson, L.A., Dawson, K., Ferdig, R., Black, N.P., Saliba, H. & Black, E.W. *Using media to bridge medical and educational approaches to healthy lifestyles for children*. University of Florida's Faculty Learning Community RFP. $21,000.

Swain, C., & Dawson, K. *University of Florida Teaching and Technology Initiative*. Role: Co-Principal Investigator. Funding agency: U.S. Department of Education PT3 grant. Funded for July 1, 2001-June 30, 2005. Total funding amount: $1,432,702.

Dawson, K., & Ferdig, R. *ILET: International Leadership for Educational Technology: A Transatlantic Bridge for Doctoral Students*. Role: Co-Principal Investigator. Funding agency: U.S. Department of Education, FIPSE grant, EC/US Cooperation Program in Higher Education and Vocational Education and Training. Funded for October 1, 2001-September 30, 2004. Total funding amount for UF: $24,454.

PUBLICATIONS

Refereed Publications (since 2012 = 19)

Liu, F., Ritzhaupt, A. D., Dawson, K., & Barron, A. E. (In press). Explaining technology integration in K-12 classrooms: A multilevel path analysis model. *Educational Technology Research and Development*.

Antonenko, P. D., Dawson, K., & Sahay, S. (2016). A framework for aligning needs, abilities and affordances to inform design and practice of educational technologies. *British Journal of Educational Technology*. doi:10.1111/bjet.12466

Dawson, K., Antonenko, P. P., Sahay, S., & Lombardino, L. (2016). How mobile app developers conceive of dyslexia and what it means for mobile app users. Interaction Design and Architecture(s) Journal - IxD&A, 28(1), 69–84.

Wang, J., Schneps, M., Antonenko, P., Pomplun, M., & Dawson, K. (2016). Do Dyslexic Learners Benefit From Holistic Processing in a Comparative Visual Search Task?. *Journal of Vision*, *16*(12), 1295-1295.

Wayer, N., Crippen, K. & Dawson, K. (2015). Design and Enactment: A Case Study of Blended Learning Across the Content Areas. *Journal of Online Learning Research*, 1(2), 219-239.

Pringle, R. M., Dawson, K., & Ritzhaupt, A. D. (2015). Integrating Science and Technology: Using Technological Pedagogical Content Knowledge as a Framework to Study the Practices of Science Teachers. *Journal of Science Education and Technology*, 1-15.

Dawson, K. & Kumar, S. (2014). Analysis of professional practice Ed.D. dissertations in Educational Technology. *Tech Trends, 58(4)*, 62-72.

Huggins, A. C., Ritzhaupt, A. D., & Dawson, K. (2014). Measuring Information and Communication Technology Literacy using a performance assessment: Validation of the Student Tool for Technology Literacy (ST2L).*Computers & Education*, *77*, 1-12.

Kumar, S. & Dawson, K. (2014). The impact factor: Measuring student professional growth in online doctoral programs. *Tech Trends*, 58(4), 89-97.

Dana, N.F., Dawson, K., Wolkenhauer, R., & Krell, D. (2013). Pushing the envelope on what is known about teacher professional development: The virtual school teacher experience. *Professional Development in Education*, DOI:10.1080/19415257.2012.762417.

Dawson, K., Dana, N.F., Wolkenhauer, R. & Krell, D. (2013). Identifying the priorities and practices of virtual school educators using action research. *American Journal of Distance Education, 27*(1), 29-39.

Dawson, K., Ritzhaupt, A. D., Liu, F., Rodriguez, P. & Frey, C. (2013). Using TPCK as a lens to study the practices of math and science teachers involved in a year-long technology integration initiative. *Journal of Computers in Mathematics and Science Teaching, 32*(4), 395-422.

Kennedy, K., Cavanaugh, C., & Dawson, K. (2013). Pre-service teachers' experience in a virtual school. American Journal of Distance Education, 27(1), 1 -15.

Ritzhaupt, A. D., Liu, F., Dawson, K., & Barron, A. E. (2013). Differences in student information and communication technology literacy based on socio-economic status, ethnicity, and gender: Evidence of a digital divide in Florida schools. *Journal of Research on Technology in Education, 45*(4), 291-307.

Dawson, K. (2012). Using action research projects to examine teacher technology integration practices. *Journal of Digital Learning in Teacher Education, 28*(3), 117-124.

Kumar, S., & Dawson, K. (2012). Exploring the impact of a professional practice education doctorate in educational environments. *Studies in Continuing Education*, 1-14.

Kumar, S., & Dawson, K. (2012). Theory to practice: Implementation and initial impact of an online doctoral program. *Online Journal of Distance Learning Administration*, *15*(1). Available from http://www.westga.edu/~distance/ojdla/

Ritzhaupt, A. D., Dawson, K., & Cavanaugh, C. (2012). An investigation of factors influencing student use of technology in K-12 classrooms using path analysis. *Journal of Educational Computing Research, 46*(3), 229 - 254.

Rodriguez, P. M., Frey, C., Dawson, K., Liu, F., & Ritzhaupt, A. D. (2012). Examining student digital artifacts during a year-long technology integration initiative. *Computers in the Schools, 29*(4), 355-374.

CURRICULUM VITAE

Rose M. Pringle

Associate Professor

Academic Appointments:

University of Florida	Associate Professor
University of Florida	Assistant Professor
Florida State University	Graduate Teaching Assistant
Mico Teachers' College	Lecturer, Science Education
The Queen's High School	Science Teacher

Education:

Florida State University	Science Education	Ph.D.
Florida State University	Science Education	M.S.
University of the West Indies	Science Education	B.Ed.
Mico Teachers' College	Secondary Science	Dip.Ed.

Teaching Effort/Experience: 50% per year

Awards:

2016 Outstanding Science Teacher Educator of the Year Level 2 from the Association for Science Teacher Education (ASTE)

2014 John Shrum Award for excellence and leadership in the education of science teachers from the Southeastern Association of Science Teacher Education (SASTE)

2014 Mary L. Collins Teacher Educator of the Year Award from the Florida Association of Teacher Educators (FATE)

2014 William R. Jones Outstanding Mentor Award from the Florida Education Fund

2009 Awarded Scholarship of Engagement – School of Teaching and Learning (COE)

2007 Nominee, Scholarship of Engagement – School of Teaching and Learning (COE)

2006 Teacher of the Year, College of Education – University of Florida

2005 Award for service to Southeastern Association for Science Teacher Education (SASTE)

2002 Teacher of the Year, College of Education – University of Florida

1999 Eddie Griffin Memorial Award for a position paper on science teacher education submitted by a graduate student

1998 Fay Kirtland Endowed Fund for Excellence in Teacher Education (scholarship): College of Education, The Florida State University

1996 National Science Teaching and Research (STAR), awarded by the Insurance Company of the West Indies for outstanding contribution to science education in Jamaica

1993 National Science Teaching and Research, (Alternate), awarded by the Insurance Company of the West Indies for outstanding contribution to science education in Jamaica

Grants:

Co- Principal Investigator (2017). *The Ag21 Project: Connecting High School Science Teachers and Students to 21st Century Innovations in the Food, Agriculture, Natural Resources, and Human Sciences.* Funding Agency: USDA-NIFA-AFRI-006354. Amount: $150,743.

Principal Investigator, (2015). *University of Florida Unites Teachers to Reform Education in Science: Preparing a New Generation of Middle Grades Science Teacher Leaders (U-FUTuRES 2.0)* Funding Agency: National Science Foundation I Corps L # 1546959. **Amount: $50,000**.

Principal Investigator, (2014). *Exploring Professional Development.* Funding Agency: School of Teaching and Learning – IDC Funds. **Amount: $3,000**.

Co-Principal Investigator, (2011). **U-FUTuRES:** *University of Florida Unites Teachers to Reform Education in Science.* Funding Agency: National Science Foundation # 1050166. **Amount: $5,000,000**.

Co-Principal Investigator, (2008). *Biomedical Explorations: Bench to Bedside.* Funding Agency: NCRR SEPA. **Amount: $64,185.**

Co-Principal Investigator, (2007). *LeTas! Let's Talk Science: A Professional learning community dedicated to generating teachers as learners and leaders engaged in the study of science for the new millennium.* Agency: FLDOE. **Amount: $967,394**

Principal Investigator, (2007). *An Investigation of African American Girls' positionality in Science and Mathematics.* Funding Agency: National Science Foundation. **Amount: $439,597**. AwardNumber:0734028.

Co-Principal Investigator, *Multi-University Reading, Mathematics and Science Initiative Funding.* Agency: Florida State University/USD.O.E. October 2004 – June 2005. **Amount: $160,000**.

Principal Investigator, *Internationalizing the Curriculum.* Funding Agency: University of Florida/Partnership for Global Learning. August 2004 – May 2005. **Amount: $3,000**.

Selected Publications (Total: 41 published)

Pringle, R., Mesa, J., & Hayes, L. (2017). Professional development for middle school science teachers: Does an educative curriculum make a difference? *Journal of Science Teacher Education.*

Dogan, S., **Pringle, R.**, & Mesa, J. (2015). The impacts of professional learning communities on science teachers' knowledge, practice, and student Learning: A review. *Professional Development in Education,* 1-20.

Pringle, R., Ritzhaupt, A. & Dawson, K. (2014). Integrating Science and Technology: Using Technological Pedagogical Content Knowledge as a Framework to Study the Practices of Science Teachers. *Journal of Science Education and Technology,* 648-662.

Mesa, J., **Pringle, R. M.**, & King, N. (2014). Surfacing students' prior knowledge in middle school science classrooms: Exception or the rule? *Middle Grades Research Journal: STEM Special Issue, 9*(3), 61-72.

Mesa, J., **Pringle, R. M.**, & Hayes, L. (2013). Show Me the Evidence! Supporting Middle School Teachers and Students in Using Evidence to Construct and Critique Scientific Arguments. *Science Scope, 39*(6), 60-64.

Nunez, E. A., **Pringle, R. M.**, & Showalter, K. T. (2012). Interrelationships among the Caribbean Secondary Examination Certificate (CSEC) Biology Syllabus, the CSEC

Biology Examinations and the Teaching of Biological Evolution in Belize. *Journal of Education and Development in the Caribbean*, *12*(2).

Pringle, R. M., Brkich, K. M., Adams, T. L., West-Olatunii, C., & Archer, Banks, D. A. (2012). Factors influencing elementary teachers' Positioning of African American girls as science and mathematics learners. *School Science and Mathematics*, *112*(4), 217-229.

Nunez, E. A., **Pringle, R. M.**, & Showalter, K. T. (2012). Evolution in the Caribbean classroom: A critical analysis of the role of biology teachers and science standards in shaping evolution instruction in Belize. *International Journal of Science Education, 34*(15), 2421-2453.

Pringle, R. M., Milton, K. L., Archer-Banks, D., West-Olatunji, C., & Adams, T. (2012). elementary teachers' actions and perceptions on the developing positionalities of African American girls' as science and mathematics learners. *School Science and Mathematics, 112*(4), 217-229.

Fang, Z., Lamme, L., & **Pringle, R.** (2010). Language and literacy in inquiry-based science classrooms, *Grades 3-8*. Thousand Oaks, CA: Corwin.

CURRICULUM VITAE

Alyson J. Adams
Clinical Associate Professor
Associate Director for Teaching and Teacher Education
Interim Associate Director for Graduate Studies

Academic Appointments

University of Florida 2003 – present

- Program Coordinator, Lastinger Center for Learning, 2003-2005
- Assistant Scholar, School of Teaching and Learning, 2005 – 2009
- Clinical Assistant Professor, School of Teaching and Learning, 2009 - 2013
- Clinical Associate Professor, School of Teaching and Learning, 2013 – present
- Associate Director for Teaching and Teacher Education, 2015 – present
- Interim Associate Director for Graduate Studies, 2017-present

EDUCATION

- Ph.D. (Curriculum and Instruction).University of Florida, Gainesville, FL, 2003. Major areas of study: Inclusive teacher education, special education, teacher collaboration.
- M.Ed. (Elementary Education). University of Florida, Gainesville, FL, 1992.
- B.S. (Business Administration - Finance). University of Florida, Gainesville, FL, 1988.

Teaching Experience

University Teaching

- EDG 7359 Teacher Learning and Professional Development (doctoral Seminar, designed and taught; online and campus-based versions)
- EDG 7252 Perspectives in Curriculum, Teaching, and Teacher Education (doctoral seminar)
- EDG 6047 Teacher Leadership and School Change (designed and taught online)
- EDG 6348 Instructional Coaching for Enhanced Student Learning (designed and taught online)
- EDE 6325 Guided Teacher Inquiry (taught online)
- EDG 6207 Transforming the Curriculum (designed and taught online)
- EDA 6423 Data Driven Decision Making (taught online)
- EDG 6953 Online Practicum / Portfolio Development (designed and taught online)
- EEX 3257 Core Teaching Strategies (taught and worked with team to refine content)

K-12 Teaching Experience

- 5th grade (all subjects, inclusion general education co-teacher): Fort McCoy K-8 School, Ocala National Forest, 1992-1995. Selected as Golden Apple Rookie Teacher of the Year for Marion County, 1994-95.
- 6th grade (language arts, inclusion general education co-teacher): Fort McCoy K-8 School, Ocala National Forest, 1995-1997.
- 6-9th grade Drop Out Prevention program (language arts/reading): Howard Bishop Middle School, Gainesville, FL, 1999.

AWARDS

- Selected as the recipient of the 2017-18 Rosser Educator Excellence Award
- Award for one of the Top Ten Most Cited Articles in the international journal, Teaching and Teacher Education, 2010.
- Nate Gage Prize for Best Article in the international journal, Teaching and Teacher Education, 2010
- AERA / Spencer Foundation Pre-Dissertation Fellow, 2001– 2002.
- Third Place, Research Poster Competition, University of FL Annual Graduate Student Forum, April, 2001.
- University of Florida Leadership in Inquiry and Teacher Education Fellowship (FLITE), 2000-2002.
- Marion County Golden Apple Rookie Teacher of the Year, 1994-95.

Grants

- Gates Foundation: Advocacy for Professional Learning: Co-Principal Investigator
  $350,000 (2014-2016)
- American Overseas School of Rome: Inquiry-based Professional Learning Communities: Principal Investigator
  $4,200 (2014)
  $5,750 (2015)
- 21st Century Community Learning Centers Administrative Project: Principal Investigator
  $1,688,100 (2011-2012)
- Kellogg Foundation: Equity Grant. Administration and co-director
  $2,000,000 (2011-2012)
- Miami-Dade County District Grant: Miami Counts! Co-wrote, designed, implemented and evaluated. Role: Principal Investigator
  $650,000 (2012-2013)
  $650,000 (2011-2012)
  $650,000 (2010-2011)
  $450,000 (2009-2010)

Selected Publications (Total: 20 published)

Dana, N. F., Bondy, E., Kennedy-Lewis, B., Adams, A., & Ma, V. W. (2016). Exemplifying the dissertation in practice. Carnegie Project on the Education Doctorate (CPED) White Paper Project. Available online: http://www.cpedinitiative.org/research-resources

Vescio, V. & Adams, A. (2015). Learning in a Professional Learning Community: The Challenge Evolves. In D. Scott & E. Hargreaves (Eds.) *The Sage Handbook of Learning* (ch 26; pp. 274-284). London: Sage.

Adams, A. & Vescio, V. (2015). Tailored to fit: Structure professional learning communities to meet individual needs. *Journal of Staff Development*, 36 (2), 26-30.

Adams, A., Ross, D., Burns, J. & Gibbs, L. (2015). Talking points: Data displays are an effective way to engage teachers. *Journal of Staff Development, 36* (1), 24-29.

Adams, A., Bondy, E., Ross, D., Dana, N.F., & Kennedy-Lewis, B. (2014). Implementing an online professional practice doctoral program in a Ph.D. environment: Managing the dilemmas. *Journal of School Public Relations*, 35 (3), 363-382.

Adams, A. & Ross, D.D. (2014). Clinical partnership at a distance: A design that transforms teaching and leadership. *Peabody Journal of Education, 89,* 533-546. doi: 10.1080/0161956X.2014.939007

Sindelar, P. T., Adams, A. J., & Leko, C. D. (2014). How can teacher education improve effective inclusive schools? In J. L. McLeskey, N. L. Waldron, F. Spooner, & B. Algozzine, (Eds.), *Handbook of effective inclusive schools: Research and practice (Ch.5, pp 55-65).* New York: Routledge.

Adams, A., Ross, D., Swain, C., Dana, N., Leite, W., & Sandbach, R. (2013). Preparing teacher leaders in a job-embedded graduate program: Changes within and beyond the classroom walls. *Teacher Education and Practice, 26* (3), 581-597.

Ross, D.D., Adams, A., Bondy, E., Dana, N, Dodman, S., Swain, C. (2011*). Preparing teacher leaders: Perceptions of the impact of a cohort-based, job embedded, blended teacher leadership program.* Teaching and Teacher Education, 27 (8), 1213-1222. doi:10.1016/j.tate.2011.06.005

Vescio, V., Ross, D., & Adams, A. (2008). A review of research on the impact of professional learning communities on teaching practice and student learning. *Teaching and Teacher Education*, *24*, 80-91. doi:10.1016/j.tate.2007.01.004

Bondy, E., Ross, D., Adams, A., Nowak, R., Brownell, M., Hoppey, D., Kuhel, K., McCallum, C., & Stafford, L. (2007). Personal Epistemologies and Learning to Teach. *Teacher Education and Special Education*, *30* (2), 67-82.

Brownell, M.T, Adams, A., Sindelar, P.T., Waldron, N., & vanHover, S. (2006). The role of teacher qualities in collaboration. *Exceptional Children*, *72* (2), 169-187.

APPENDIX D
External consultants' report of review of the proposed MS and PhD programs in Anatomical Sciences Education

Reviewer 1: Dr. Michael Lehman, Professor and Chair, Department of Neurobiology and Anatomical Sciences, University of Mississippi Medical Center, Jackson, MS

Overall, these are important and innovative new graduate programs which will add significant and exciting new opportunities for research and training of students at the University of Florida. Anatomy as an academic discipline is currently undergoing a fundamental transformation in its identity and core mission, moving from a traditional discipline focused on wet lab research and teaching to a discipline that centers around the careers of faculty who are master teachers and educator-scholars, applying evidence-based knowledge about how students best learn to the classroom. The proposed programs will play a key role in supporting this disciplinary change by providing the formative content, skills and experiences essential to train future generations of educator-scholars in the anatomical sciences. In addition, the collaboration between the Schools of Medicine and Education in this degree-granting program is novel and forward-thinking, presenting unique opportunities for types of training experiences students can take advantage of, as well as expanding the pool of potential applicants to those with a primary interest and background in education.

Comments/suggestions:

1) One of the tracks of the proposed MS program in Anatomy Education is intended to attract students who will later apply to biomedical PhD programs. While master's programs are often useful in preparing undergraduate students for PhD training in fields such as neuroscience, cell and molecular biology, it's not clear that the anatomy education focus of the proposed MS program will best serve this purpose. Rather, MS programs that prepare students for biomedical science PhDs usually feature didactic coursework in fundamental core topics appropriate for biomedical science research (e.g., molecular biology, integrative biology, genetics). Perhaps the proposed MS program is viewed as a transition and first step toward a broader biomedical science master's degree program at UF, similar to biomedical MS programs elsewhere.

2) The value of graduate training in anatomical education extends well beyond the goal of providing faculty/instructors who are master teachers for medical schools. In fact, anatomical sciences are an essential and core part of the curriculum for the training of dental and health science (OT, PT) students as well as a variety of other health care professionals (e.g., physician assistants). In addition, graduates of similar programs at my current (University of Mississippi Medical Center) and previous (University of Western Ontario) institutions have obtained teaching positions at community colleges and other undergraduate universities where anatomy, histology, neuroanatomy and development anatomy are part of the course offerings. It is also likely that trained anatomy educator-scholars will also find positions in secondary education, both public and private schools. Thus, there will be a wide array of potential job opportunities for graduates of the proposed MS and PhD programs, and this further supports the long-term value of these programs to the State of Florida and the region.

3) A critical element for the success of training programs in anatomy education, specifically

for PhD programs, is the availability of stable stipend and tuition support for students during all years of their training. Unlike the situation with traditional biomedical science PhD programs, where stipend/tuition support of students beyond their first and sometimes second year is dependent on resources from the supervisor's lab (either external awards, e.g., NIH R01 or F31/T32 grants, or internal start-up funds), students in Anatomical Education PhD programs rely on institutional funds for stipend support, since there are very few opportunities for external research awards that support educational scholarship. Hence, a strong institutional commitment to stipend and tuition support for a limited number of PhD students is critical for such PhD programs to succeed. This support often comes in the form of teaching assistantships. At some institutions, tuition generated from anatomy courses in which the TAs serve as teaching staff is the source of this support; TAs in these courses are often viewed as helping meet the required teaching workforce. Regardless of the source of support, the ability to offer competitive stipends and tuition support to PhD students in the proposed program is essential in order to successfully recruit the very best applicants as well as set a high level of expectation for achievement among entering students.

4) A limiting factor to future growth of the proposed MS and PhD program will be the number of faculty with active education research programs who can serve as supervisors and research mentors for students. While a small critical mass of such faculty is sufficient for the program's launch, it is important that the sponsoring schools be committed to long-term growth of the number of anatomy educator-scholars in their faculty. This includes not only recruitment of junior anatomy educators when positions become available, but providing the career development support (including protected time) so that these junior faculty can develop their own independent line of research in anatomy education, publish and present their work and meetings, and ultimately contribute to the training and supervision of graduate students.

Reviewer 2: Pawlina, Wojciech M.D., Professor and Chair of Anatomy and Editor of Anatomical Sciences Education
Department of Anatomy, Mayo Clinic, Rochester, MN

I read your proposal with interest. It is well written with rational explanations for the needs to create such program.

I am glad that this is joint venture with College of Education which provides the theoretical and practical base for education research and knowledge. In my opinion, the important issue from the College of Medicine is the issue of faculty development for this PhD program. Since most of the education research would be performed based on data and experiments conducted during anatomy curriculum, I would envision that you would create a core medical faculty with sufficient knowledge in education. They of course could be trained at UF (College of Education), but also I would suggest to delegate your selected faculty members to participate in national courses such as those offered in Harvard Macy Institute in Boston by attending annually offered Program for Educators in Health Professions. This program consists of two sessions in residence at Harvard: a 10 day winter session and a 6 day spring session. I feel this could be beneficial for your selected faculty.

Part of scholarship of teaching and learning is dissemination of students' work. Students should have a secure funding to be allow to travel to national and international meeting (both anatomy and education) to present their works which could be also serve as a great marketing strategy for your program (especially in early stages).

A small comments. In point #3 of you proposal (last paragraph) you mentioned 3 schools (Pen state, Indiana University, and University of Mississippi) with similar programs. Actually there is a 4th school in Canada (Western University) in London, Ontario, which has well developed program for PhD in anatomical sciences educations. This program supplies quite a few well qualified graduates to many US medical schools. What is interesting, that these graduates are getting permanent faculty positions (with 6 figures salary) without going through any post-doctoral training. This should be our next step in developing nationwide post-doctoral training curriculum for graduates from such programs.

Reviewer 3: James J. Brokaw, PhD, MPH, Professor and Vice Chair for Education and Director, Education Track PhD Program, Department of Anatomy and Cell Biology, Indiana University School of Medicine, Indianapolis, IN

RE: Critique of Pre-Proposal for New Academic Degrees- MS in Anatomical Sciences and PhD in Anatomical Sciences Education

Thank you for giving me the opportunity read your department's preproposal and offer my thoughts and suggestions. First, let me commend you for moving your department in this direction and offering MS and PhD degrees with a specific focus on anatomical teaching and educational scholarship. As the director of similar programs at Indiana University, I can attest to the need and growing demand for qualified anatomy educators who can teach all of the anatomical disciplines and conduct medical education research for promotion and tenure. Rarely a week goes by were I don't receive at least one phone call or e-mail from a program somewhere seeking to fill a faculty tenure-track teaching position in anatomy. As might be expected, most of the demand is for gross anatomy teachers, but occasionally the need is for faculty who can teach neuroanatomy or histology & cell biology.

I will direct my comments first to the master's degree then to the PhD degree. The pre-proposal does not include the planned curricula or other specific details about these degrees, so my comments will likewise be of a general nature. I may be making certain assumptions about the specifics that will differ from what is actually developed and implemented for your programs.

MS Degree in Anatomical Sciences:

The pre-proposal indicates three curricular tracks for the MS degree: {1) an education track for those whose career focus is teaching, {2) a pre-professional track for those interested in medical school or other health professions, and {3) a biomedical track for those interested in bench research.

These tracks are proposed to be delivered 85% online and 15% on-site. I question whether it is really feasible to teach anatomy courses, particularly gross anatomy, via distance learning. I am aware of at least one medical school (Drexel) that offers online remedial courses in histology, neuroscience, and gross anatomy for medical students. However, these remedial courses assume that students have previously taken a full course with laboratory at their home institutions. It seems to me that without the experience of cadaveric dissection, an online course in gross anatomy would be of limited value, at least for the students in the education track who presumably need to be able to teach a dissection-based course. Perhaps it is assumed that these students would gain dissection experience when they complete their capstone project *"by preparing prosections and assisting in a*

laboratory-based gross anatomy course." I have similar concerns about the efficacy of distance learning for histology and neuroscience, particularly for those students who aspire to teach these disciplines themselves.

I recognize that the decision to offer the MS program online is probably based on the desire to appeal to a geographically broad audience of potential students, many of whom would be unable to complete a full program on-site. Perhaps a well-designed capstone project on-site may be sufficient to achieve the desired outcomes and mitigate some of the limitations of on-line coursework.

PhD Degree in Anatomical Sciences Education:

On page 4, the first sentence under this heading states: "This proposed doctoral program is designed for teachers in secondary education, anatomy instructors at community colleges who wish to further training to teach in higher levels of education, and others seeking post baccalaureate education in the anatomical sciences." This is almost a verbatim description of the MS education track in the Program Summary on page 2.

This makes it sound as though the focus of the PhD program is for instructors at undergraduate institutions. There is no mention of faculty at medical schools or other health professions schools. Although the need for anatomists at these institutions is clearly articulated on page 6 of the proposal, I suggest modifying the description on page 4 to more accurately reflect the focus of the PhD program to better distinguish it from the focus of the MS education track.

The remainder of my comments are really suggestions based on my nearly 10 years of experience directing the Education Track PhD program at Indiana University. These suggestions may already be addressed in the curriculum you are planning, so take them for whatever they are worth.

- Prepare your students to be fully qualified teachers in all of the anatomical disciplines: gross anatomy, embryology, histology, and neuroanatomy. This is one of the selling points about our program I can tell prospective schools looking to hire new anatomy faculty members.
- Require your students to take the same anatomy courses as the medical students. This will insure that they know how professional students need to be taught, and I having this background seems to assure prospective employers that our graduates are ready to teach their students.
- Require your students to take other biomedical courses, not just anatomy courses. We require our students to take the medical courses in cell & molecular biology and physiology. This gives them a solid foundational knowledge that helps them understand and teach anatomy. This is becoming increasingly important as medical schools are moving their curricula to be more integrated" and expect faculty to combine material from, say, anatomy and physiology or histology and biochemistry.
- Consult with your School of Education to develop a solid core of education coursework to cover such topics as pedagogy, curriculum design, adult learning theory, qualitative research methods, quantitative research methods, and statistics.
- For their dissertation work, encourage students to pursue a broad array of medical education research topics, not necessarily restricted to anatomy. The students will be stronger and more versatile educational researchers if they branch out into other areas of interest. This lends them credibility to the broader community of medical education

researchers and opens up more avenues for publishing and presenting their work.

Appendix E: Data of Graduate Program within SUS

	Certificate Program	Masters of Sciences in Medical Sciences Program	PhD Program Biomedical Sciences
USF (813) 974-9908 (813) 974-4181 * Barber	No Certificates	Masters of Science in Medical Sciences 1,000 applications Admit 350; enroll 180 5 concentrations Anatomy concentration 80 applied; 45-50 admitted; 35 enrolled	PhD Program in Medical Sciences 150 Apply 18 admitted/year No concentration in anatomy
UCF (407) 823-3462 Samantha Jackson Dr. Pabian (?) (407) 823-2766 Graduate Office		MS Biomedical Sciences (non-thesis) Program/year for 2017-98 Number of accepted/enrollees and total number in program currently-for 2017-39; total ~80	PhD program in Biomedical Sciences/year for 2017-106 applied Number of accepted/enrollees in the PhD program/year and total number in program currently. For 2017-17, total 66
FIU (305) 348-4372	Molecular-Biomedical Sciences 1st cycle, 700 applied; took 48; 2nd cycle, 300 applied; will take 78	No Masters	PhD program in Biomedical Sciences 35-50 apply/year; Accept 3-5
UF	11 Certificate Programs; Dept. of Anatomy and Cell Biology has 2 certificate programs that were established in 2012. Dept. of Anatomy and	8 Masters program – none associated with anatomy and/or education	PhD program in Biomedical Sciences 275-300 Applied; Offered 70; Enrolled 35

	Cell Biology was approved for a 3rd certificate program – Anatomical Sciences Education conjunction with College of Education, Program will begin Summer 2018		

Appendix F: Data of 4 Programs in the United States and Canada Anatomical Sciences Education

	Masters	PhD
Indiana University School of Medicine https://medicine.iu.edu/departments/anatomy-cell-biology/education-programs/graduate-degrees/phd/education-track/ James Brokaw Professor and Vice Chair for Education Director, Education Track PhD Program Department of (317) 274-1966	No masters	12-15 apply/year; program is not advertised. Accepts 2-3/year. Have 10 graduates; 2 more next spring. Therefore, 12 graduates in 10 years.
Western University, Ontario http://www.schulich.uwo.ca/anatomy/graduate/program_information/index.html Marjorie Johnson, PhD Outgoing-Associate Chair Clinical Anatomy Western University 519-661 2111 ext 86756	Masters of Science in Clinical Anatomy 50-60 apply; admit 15	1-2 directly matriculate; most rollover from masters - ~7-8 students/year. Currently => 20 students in program
University of Mississippi https://www.umc.edu/som/Departments%20and%20Offices/SOM%20Departments/Neurobiology/Education/Department-Courses.html Andres Notebaert Assistant Professor Director, Graduate Program in Clinical Anatomy 601) 984-1640	No Masters at this time;	Neurobiology & Anatomical Sciences Program started 4 years ago. Currently have 5 students or/graduates. Check? Note: Dr. Notebaert stated that there are ~100 anatomy teaching positions open at this time. They are considering offering a post-doc

		fellowship in anatomical education.
Penn State http://med.psu.edu/anatomy-ms Kristin Smith, graduate coordinator (717) 531-1045	4 students enrolled in program	13 enrolled in program

APPENDIX G: Curriculum of the 4 Programs that offer Anatomical Sciences Education degrees

1. Indiana University PhD in Anatomy and Cell Biology:

New Curriculum for Education Track PhD in Anatomy and Cell Biology
Indianapolis Version

Biomedical Courses (35-37 hours)

- MED X620 Human Structure (8)
- MED X630 Molecules to Cells and Tissues (8)
- MED X660 Neuroscience and Behavior (6)
  OR
- ANAT D701 Translational Neuroscience (5)
- MED X640 Fundamentals of Health and Disease (6)
  OR
- PHSL F503 Human Physiology (5)
- ANAT D861 Anatomy Education Seminar (1); required yearly, which would sum to 5 credit hours assuming a 5-year degree completion time; this seminar series will focus on educational topics rather than bench research.
- ANAT D878 Anatomy Teaching Practicum (2); supervised teaching in Gross Anatomy, Histology, and Neuroscience (repeated twice for 4 hours total); this teaching will entail lecturing as well as assisting in laboratory instruction.

Education Courses—Doctoral Minor (18 hours)

- MSCI M620 Pedagogical Methods in the Health Sciences (3)
  OR
- SHRS W672 College Teaching Methodologies (3)
- EDUC J500 Instruction in the Context of Curriculum (3)
  OR
- EDUC C750 Curriculum in Higher Education (3)
- EDUC P540 Learning and Cognition in Education (3)
- EDUC Y611 Qualitative Inquiry in Education (3)
- EDUC Y521 Methodological Approaches to Educational Inquiry (3) (PREFERED)
  OR
- EDUC Y520 Strategies for Educational Inquiry (3)
  In special circumstances, either of the courses below may substitute for Y521 or Y520 with permission of the student's advisory committee:
  - *EDUC Y510 Action Research (3)*
  - *EDUC C750 Scholarship of Teaching and Learning (3)*
- And select **ONE** of these**:**
  - EDUC Y525 Survey Research (3)
    OR
  - EDUC Y603 Statistical Design of Educational Research (3)
    OR
  - EDUC C750 Topical Seminar (3)
  - **OR**
  - Another education course if approved by the student's advisory committee

Statistics Courses (6-7 hours)

- EDUC Y502 Intermediate Statistics Applied to Education (3); requires concurrent registration with EDUC Y500 Computer Lab for Educational Statistics (1) (prerequisite: EDUC Y520 Strategies for Educational Inquiry or a course in basic statistics)
  OR
- PBHL B551 Biostatistics for Public Health I (3)
- EDUC Y604 Multivariate Analysis in Educational Research (3)
  OR
- PBHL B652 Biostatistics for Public Health II (3)

Electives and Research Credits (28-31 hours)

- Electives to be selected in consultation with advisor. Students are encouraged to take at least 9 hours of advanced coursework in the biomedical sciences, education, or statistics. Examples of suitable electives include but are not limited to:
  - ANAT D864 Advanced Gross Anatomy (2)
  - ANAT D856 Advanced Histology (2)
  - ANAT D875 Advanced Neuroanatomy (2)
  - ANAT D700 Educational Research Practicum (2)
  - ANAT D878 Anatomy Teaching Practicum (2)
  - ANAT D853 Human Developmental Anatomy (3)
  - GRDM G655 Research Communications Seminar (1)
  - STAT 53300 Nonparametric Statistics (3)
  - PSY 60800 Measurement Theory and Interpretation of Data (3)
  - TECH 58100 Mixed Methods Research (4)
  - EDUC Y612 Critical Qualitative Inquiry (3)
  - EDUC C795 Dissertation Proposal Preparation (3)
- ANAT D860 Dissertation Research (cr. arr.)—sufficient to complete the 90 credit hour degree requirement

2. Department of Anatomy and Cell Biology, Western University, London, Ontario:
a. PhD in Anatomy and Cell Biology
http://www.schulich.uwo.ca/anatomy/graduate/program_information/anatomy_cell_biology_info.html

- 9245 Cellular Bioengineering
- 9500 Mammalian Histology
- 9520 Current Topics in Cell & Neurobiology
- 9531A Neuroscience for Rehabilitation Sciences
- 9550 Advanced Topics in Integrative Neuroscience
- 9555 Advanced Topics in Cell Biology
- 9560 Human Anatomy & Embryology
- 9561 Clinical Mammalian Histology
- 9562 Educational Techniques: Teaching Certificate
- 9565A Introduction to Teaching and Learning in Anatomy
- 9566 Clinical Anatomy Seminar
- 9567L Medical Imaging for Clinical Anatomy
- 9569B Clinical Neuroanatomy
- 9580 Research

- 9605 Comprehensive Cell Biology
- 9620 Current Topics in Cell & Neurobiology
- 9650 Advanced Topics in Integrative Neuroscience
- 9655 Advanced Topics in Cell Biology
- 9666 Clinical Anatomy Seminar

b. MSc in Clinical Anatomy
http://www.schulich.uwo.ca/anatomy/graduate/program_information/clinical_anatomy_info.html

MSc in Clinical Anatomy
The Division of Clinical Anatomy in the Department of Anatomy and Cell Biology first introduced a Master's in Clinical Anatomy in September 2005. This plan of study is designed to meet the ever-increasing need in North America for instructors who can teach cadaveric gross anatomy. A Master's in Clinical Anatomy will provide students with the necessary skills to teach clinically-oriented cadaveric anatomy in medical, dental and professional health science programs. This 20-month plan of study will include courses in human gross anatomy, embryology, histology, human neuroanatomy and pathology/physiology. Students will also have opportunities to attend surgeries.

Learning Outcomes
The goal of this unique non-thesis program is to prepare the next generation of medical educators, scholars, and interdisciplinarians focused on the anatomical sciences or anatomically-intensive disciplines (i.e. radiology, surgery, medical imaging) as well as collaborative research with cell biologists and neurobiologists within the department.

Courses
MSc Clinical Anatomy students enroll in a series of graduate courses, as listed below. The majority of the courses are taken in the first 2 terms of the program. The project course (9580) and the Teaching Certificate Course (9562) span the full 5 terms of the MSc Clinical Anatomy program.

9560 Human Anatomy & Embryology
9561 Clinical Mammalian Histology
9562 Teaching Certificate: Educational Techniques
9565B Introduction to Teaching & Learning in Anatomy
9566 Clinical Anatomy Seminar – Professionalism and Journal Club
9567L Medical Imaging for Clinical Anatomy
9569B Clinical Neuroanatomy
9580 Clinical Anatomy Project – Research or Teaching

The courses in the MSc Clinical Anatomy stream have continued to evolve over the past five years, with an enhanced focus on the development of outstanding educator/scholars in the anatomical sciences. In addition, the revised 9580 Project course was launched in order to provide students with an opportunity to either undertake a novel research project in anatomical sciences, education scholarship, or cell biology/neurobiology; or to develop and deliver an innovative teaching program. This new course format provides a more structured and rigorous evaluation process for students as well as providing the option of focusing on anatomy teaching versus traditional bench-top research.

3. University of Mississippi PhD Graduate Program in Clinical Anatomy:
https://www.umc.edu/som/Departments%20and%20Offices/SOM%20Departments/Neurobiology/Education/Clinical-Anatomy/Graduate-Program-in-Clinical-Anatomy/Graduate-Program-in-Clinical-Anatomy.html

PhD Plan of Study - Clinical Anatomy
The first two years of coursework are shown below. In the summer semester of the third year, students sit for their qualifying exams. Successful students then continue on to do research with a chosen mentor in the Clinical Anatomy Program. In the spring semester of the third year, students take ID 714 Professional Skills for Graduate Students; they are otherwise involved in dissertation research (ANAT 798) until they graduate.

Clinical anatomy track
Year 1, Fall
- ANAT 711 Gross Anatomy
- ANAT 713 Histology and Cell Biology
- ANAT 716 Developmental Anatomy

Year 1, Spring
- ANAT 715 Neurobiology
- ANAT 713 Histology and Cell Biology
- ANAT 717 Clinical Anatomy Research Rotations
- ANAT 742 Introduction to Problems in Clinical Anatomy
- ID 709 Responsible Conduct in Research

Year 2, Summer
- ANAT 717 Clinical Anatomy Research Rotations

Year 2, Fall
- ANAT 730 Teaching Practicum in Gross Anatomy
- ANAT 731 Teaching Practicum in Histology and Cell Biology
- ANAT 717 Clinical Anatomy Research Rotations
- ANAT 743 Skills Development in Clinical Anatomy I
- ID 740 Statistical Methods in Research I

Year 2, Spring
- ANAT 717 Clinical Anatomy Research Rotations
- ANAT 731 Teaching Practicum in Histology and Cell Biology
- ANAT 733 Teaching Practicum in Neurobiology
- ANAT 744 Skills Development in Clinical Anatomy II

* ANAT 733, Teaching Practicum in Neurobiology, may be taken rather than ANAT 731.
** Every other year students take ANAT 703, Seminar in Writing Biomedical Research Papers, instead of ANAT 722.

4. Pennsylvania State University

a. Master of Science in Anatomy
https://students.med.psu.edu/anatomy-graduate-program-information/anatomy-graduate-program-handbook/masters-courses/

The program, generally completed within two years, requires a minimum of 30 credit hours in

anatomical courses (human gross anatomy, histology, and embryology) and biomedical classes along with multidisciplinary research that culminates in an oral defense of a written thesis.

The Master of Science in Anatomy is an academic degree and requires a minimum of 30 graduate credits with at least 18 credits at the 500-level or above. A GPA of 3.0 is required at the time of graduation.

Required Courses

- ANAT 503 Human Gross Anatomy
- ANAT 512 Human Embryology
- ANAT 505 Microscopic Anatomy I
- ANAT 506 Microscopic Anatomy II
- Human Structure Cadaveric Laboratory
- ANAT 590 Colloquium
- ANAT 600 Laboratory Research (6 credits; normally taken during last semester)
- Biomedical Ethics (1 credit)
- Electives (3 to 6 credits)

The Anatomy MS Program must be completed in six semesters unless the student has received prior approval (due to extenuating circumstances) for an extended course of study.

b. PhD in Anatomy

https://students.med.psu.edu/anatomy-graduate-program-information/anatomy-graduate-program-handbook/

Curriculum

In addition to the traditional areas of study including human gross anatomy, human didactic laboratory (human structure), human microscopy anatomy and human embryology, the 30-credit curriculum includes core courses in neuroanatomy, cell biology, systems biology and energy metabolism. Courses in ethics ensure students will conduct their activities with the highest of ethical standards.

Each student will conduct original biomedical research under the supervision of a faculty member culminating in the oral defense of a written thesis.

Doctoral students also have the opportunity to gain teaching experience in discipline-specific fields of human embryology, medical gross anatomy, and neuroanatomy, and to engage in all areas of didactic, team-based learning and cadaver-laboratories for medical students and physician assistant students.

Coursework

During the first year of the Anatomy Graduate Program, incoming students focus on required anatomical courses, including Human Gross Anatomy, Human Embryology, Human Microscopic Anatomy (histology), and Human Neurobiology.

During the second year, students complete 6 credits of requisite graduate core curriculum, electives, research-related activities and professional development courses. Upper-class anatomy students have a unique opportunity to be involved in teaching gross anatomy to physician

assistant and medical students, and advanced gross anatomy to residents and/or clinicians.

Required Courses

- ANAT 503 Human Gross Anatomy
- ANAT 512 Human Embryology
- ANAT 505 Microscopic Anatomy I
- ANAT 506 Microscopic Anatomy II
- NEURO 511 Human Neurobiology
- BMS 502 Cell and Systems Biology
- BMS 503 Flow of Cellular Information
- ANAT 602 Mentored Teaching
- Ethics (1 credit)
- Electives

Teaching

Teaching is a significant and unique component of the Anatomy Graduate Program.
Beginning in the second year, qualified graduate students may participate in the medical curriculum, the Human Gross Anatomy course for medical students.
While the graduate council does not permit teaching to an equal rank, involvement in the medical curriculum is permitted.
Students are involved in the course, particularly in the laboratory sessions and laboratory exams.
Exceptional students may be asked to provide tutoring, review sessions, and lectures.
These experiences are unique to this curriculum and provide an excellent opportunity for students to be engaged in higher education instruction.
Students are able to undertake this opportunity each year and are compensated by the program providing a stipend for the 2 months of the class.

Academic Requirements

To be awarded a PhD degree in Anatomy, the student must successfully:

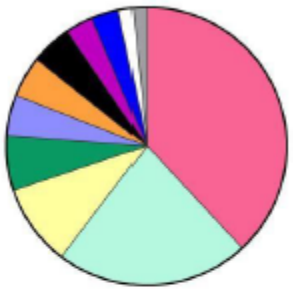
- Earn a total of 30 credit hours, of which at least 18 must be in 500- and 600-level courses. Students must maintain a B average (3.0) or better in academic courses to be retained in the program and to continue to receive financial support.
- Assist in teaching one of the laboratory courses: either Gross Anatomy or Neuroanatomy.
- Satisfactorily complete the following: (i) candidacy examination, and (ii) comprehensive examinations. Students must also demonstrate competency in the English language.
- Complete the ethics course.
- Complete an original research project, and orally defend, in a public forum, a written thesis describing the experimental design, results, and significance of the work.

Doctoral students must maintain a 3.0 (B) average to remain in good academic standing, and to be eligible for both the candidacy and comprehensive examinations.
In addition, doctoral students must complete all 15 credits of required anatomy courses with grades of B- or better.

Appendix H. Western Ontario's Outcomes/Employment of ACT Graduate Students by Stream for Past 5 Years

FIGURE 7: Outcomes/Employment of ACB Graduate Students by Stream; Past 5 Years

MSc Clinical Stream



- 38.10% Medicine
- 22.22% Lecturer/Instructor/Teacher
- 9.52% PhD Studies
- 6.35% Dentistry
- 4.76% Anatomy Prosector/Technician
- 4.76% Research Technician
- 4.76% Nursing
- 3.17% Physiotherapy/Occupational Therapy
- 3.17% Applying for Medicine or Dentistry
- 1.59% Government (Data Analyst)
- 1.59% MSc studies (Pathology Assistant Program)

MSc Research Stream

- 35.14% Medicine
- 16.22% Dentistry
- 10.81% Research Technician
- 8.11% PhD Studies
- 8.11% Physiotherapy/Occupational Therapy
- 5.41% Opthamology
- 5.41% Applying for Medicine or Dentistry
- 2.70% Health Care Sector (Data Analyst)
- 2.70% Law
- 2.70% Athletic Coach
- 2.70% Unknown

PhD Stream

- 40.63% Postdoctoral Fellows (Basic/Clinical Research)
- 15.63% Medicine
- 12.50% Lecturer/Instructor
- 9.38% Academic Staff (Research Consultant/Facility Manager/Grants Officer)
- 6.25% University Faculty
- 6.25% Government (Program Manager/Policy Advisor)
- 3.13% Dentistry
- 3.13% Health Care Sector (Program Manager)
- 3.13% Full-time parent

Anatomy and Cell Biology Department in the College of Medicine
The Schools of Teaching and Learning and Human Development and Organizational Studies in the College of Education

Anatomical Sciences Education Program

The Anatomical Sciences Education graduate program offers the Master of Science and the Doctor of Philosophy degrees. The faculty for this program is drawn from these disciplines:

- Anatomy
- Education

For both MS program and Ph.D. program, applicants must meet the minimum requirements for the University of Florida Graduate School: Junior/Senior GPA > 3.0 and a score on the Graduate Record Exam (GRE) of 1000 combined verbal and quantitative for the old scale, and a minimum score of 300 for the new scale. The student will submit a minimum of three letters of reference, a statement of purpose, and a resume, which the admissions committee will use to assess the student's qualifications for admission to the program. International students must comply with current UF standards for admission to the Graduate School, including requirements for English language competency and financial responsibility.

Contact Mark Zakshevsky at zmz30@ufl.edu
or visit the program's website at https://anatomy.acb.med.ufl.edu/.

Degrees Offered with a Major in Anatomical Sciences Education

Doctor of Philosophy

Master of Science

Anatomical Sciences Education Courses

The online Master of Science program will require 32 post-baccalaureate hours. There are required 11 credit hours of core courses in Anatomy and Cell Biology and 6 credit hours of core courses in Education for a total of 17 hours of core courses. Fifteen credit hours of elective courses will be tailored to the educational, pre-professional, or biomedical research student. Up to 12 credits can be transferred from the Anatomical Sciences Education Certificate program.

- GMS 5605: Medical Anatomy
- GMS 5606L: Medical Anatomy Lab
- GMS 5630: Medical Histology
- GMS 5057: Medical Cell Biology
- EME 5207: Designing Technology-Rich Curricula
- SCE 5140: Science Curriculum Development
- GMS 5604: Medical Human Embryology

- GMS 5613: Medical Human Anatomy by Diagnostic Imaging
- GMS 6400C: Principles of Physiology
- GMS 6007: Fundamentals of Neuroscience
- GMS 6607C: Musculoskeletal Systems
- GMS 6705: Functional Human Neuroanatomy

- SCE 5140: Science Curriculum Development
- SCE 5765: Data-Driven Science Instruction
- EME 5405: Internet in K-12 Instruction
- EDF 7486: Methods of Educational Research
- EME 5207: Designing Technology-Rich Curricula

The Ph.D. program will require a minimum of 90 post-baccalaureate credit hours. Up to 30 credits may be transferred from an accredited Master of Science program at the discretion of the Program Director and following the protocols of the University of Florida Graduate School.

Courses

- GMS 5604: Medical Human Embryology
- GMS 5605: Medical Anatomy
- GMS 5606L: Medical Anatomy Lab
- GMS 5613: Medical Human Anatomy by Diagnostic Imaging
- GMS 5630: Medical Histology
- GMS 5057: Medical Cell Biology
- GMS 6607C: Musculoskeletal Systems
- GMS 6940: Supervised Teaching
- GMS 6690: Molecular Cell Biology Journal Club
- GMS 7979: Advanced Research
- GMS 7980: Research for Doctoral Dissertation
- GMS 6007: Fundamentals of Neuroscience
- GMS 6400C: Principles of Physiology
- GMS 6421: Cell Biology
- GMS 6691: Special Topics in Cell Biology and Anatomy
- GMS 6705: Functional Human Neuroanatomy
- SCE 5140: Science Curriculum Development
- EDG 6305: Multiple Perspectives on Teaching and Learning
- EME 6458: Distance Teaching and Learning
- EME 6065: Human-Computer Interaction and the Learner
- EDG 6931: Special Topics: “Teaching Adults”
- EDG 6931: Special Topics: Survey of Research Methods in STEM Education
- EDF 6403: Quantitative Foundations of Educational Research
- EDF 6475: Qualitative Foundations of Educational Research
- EDG 7252: Perspectives in Curriculum, Teaching, and Teacher Education

- EME 6458: Distance Teaching and Learning
- EME 6059: Blended Learning Environments
- EDF 6520: History of Education
- EDF 6544: Philosophical Foundations of Education
- EDF 6017: Writing for Academic Purposes
- EDF 6402: Quantitative Foundations in Educational Research: Inferential Statistics
- EDF 6471: Survey Design and Analysis in Educational Research
- EDF 7412: Structural Equation Models
- EDF 7474: Multilevel Models
- EDF 7932: Multivariate Analysis in Educational Research
- EDF 6475: Qualitative Foundations of Educational Research
- EDF 7479: Qualitative Data Analysis: Approaches and Techniques
- EDF 7483: Qualitative Data Collection: Approaches and Techniques
- EDF 7486: Methods of Educational Research

The online MS program will require 32 post-baccalaureate hours. There are required 11 credit hours of core courses in Anatomy and Cell Biology and 6 credit hours of core courses in Education for a total of 17 hours of core courses. Fifteen credit hours of elective courses will be tailored to the educational, pre-professional, or biomedical research student. Up to 12 credits can be transferred from the Anatomical Sciences Education Certificate program with permission.

Courses (All courses are currently available online)

Required Core Anatomy and Biomedical Courses: 11 credit hours	
GMS 5605: Medical Anatomy	3
GMS 5606L: Medical Anatomy Lab	2
GMS 5630: Medical Histology	3
GMS 5057: Medical Cell Biology	3
Required Core Education & Research Courses: 6 credits	
EME 5207: Designing Technology-Rich Curricula	3
SCE 5140: Science Curriculum Development	3
Elective Courses: 15 credits	
Elective: Anatomy and Biomedical Courses	**(Select at least two)**
GMS 5604: Medical Human Embryology	3
GMS 5613: Medical Human Anatomy by Diagnostic Imaging	2
GMS 6400C: Principles of Physiology	6
GMS 6007: Fundamentals of Neuroscience	2
GMS 6607C: Musculoskeletal Systems	4
GMS 6705: Functional Human Neuroanatomy	4
Elective Education & Research courses:	**(Select at least one)**
SCE 5140: Science Curriculum Development	3
SCE 5765: Data-Driven Science Instruction	3
EME 5405: Internet in K-12 Instruction	3
EDF 7486: Methods of Educational Research	3
EME 5207: Designing Technology-Rich Curricula	3

The PhD program will require a minimum of 90 post-baccalaureate credit hours. Up to 30 credits may be transferred from an M.S. or other master's program at the discretion of the Program Director and the Graduate School.

Courses

Core Anatomy & Biomedical Courses (Required)	
GMS 5604: Medical Human Embryology	3
GMS 5605: Medical Anatomy	3
GMS 5606L: Medical Anatomy Lab	2
GMS 5613: Medical Human Anatomy by Diagnostic Imaging	2
GMS 5630: Medical Histology	3
GMS 5057: Medical Cell Biology	3
GMS 6607C: Musculoskeletal Systems	4

GMS 6940 Supervised Teaching	3
GMS 6690: Molecular Cell Biology Journal Club	1

Dissertation Research (Required)

GMS 7979: Advanced Research	
GMS 7980: Research for Doctoral Dissertation	1-15 (S/U)

Anatomy and Biomedical Courses (Elective)

GMS 6007: Fundamentals of Neuroscience	2
GMS 6400C: Principles of Physiology	6
GMS 6421: Cell Biology	4
GMS 6691: Special Topics in Cell Biology and Anatomy	3
GMS 6705: Functional Human Neuroanatomy	4

Curriculum & Instruction Courses (Required, select 2)

SCE 5140: Science Curriculum Development	3
EDG 6305: Multiple Perspectives on Teaching and Learning	3
EME 6458: Distance Teaching and Learning	3
EME 6065: Human-Computer Interaction and the Learner	3
EDG 6931: Special Topics: "Teaching Adults"	3

Educational Research Courses (Required, select 2)

EDG 6931: Special Topics: Survey of Research Methods in STEM Education	3
EDF 6403: Quantitative Foundations of Educational Research	6
EDF 6475: Qualitative Foundations of Educational Research	4

Curriculum & Instruction/Education Research Courses (Electives)

EDG 7252: Perspectives in Curriculum, Teaching, and Teacher Education	3
EME 6458: Distance Teaching and Learning	3
EME 6059: Blended Learning Environments	3
EDF 6520: History of Education	3
EDF 6544: Philosophical Foundations of Education	3
EDG 6017: Writing for Academic Purposes	3
EDF 6402: Quantitative Foundations in Educational Research: Inferential Statistics	3 3
EDF 6403: Quantitative Foundations of Educational Research	3
EDF 6402: Quantitative Foundations in Educational Research: Inferential Statistics	3
EDF 6471: Survey Design and Analysis in Educational Research	3
EDF 7412: Structural Equation Models	3
EDF 7474: Multilevel Models	3
EDF 7932: Multivariate Analysis in Educational Research	3
EDF 6475: Qualitative Foundations of Educational Research	4
EDF 7479: Qualitative Data Analysis: Approaches and Techniques	3

EDF 7483: Qualitative Data Collection: Approaches and Techniques3
EDF 7486: Methods of Educational Research 3

A. Provide a sequenced course of study for all majors, concentrations, or areas of emphasis within the proposed program.

Proposed Plan of Study for MS program:		
Term	**Course**	**Credits**
Fall Year 1	GMS 5605 Medical Anatomy	3
	GMS 5606L Medical Anatomy Lab	2
	Elective	3
Spring Year 1	GMS 5630 Medical Histology	3
	GMS 5057 Medical Cell Biology	3
Summer Year 1	EME 5207 Designing Technology-Rich Curricula	3
	Elective	3
Fall Year 2	SCE 5140 Science Curriculum Development	3
	Elective	3
Spring Year 2	Elective	3
	Elective	3
	Total	32

Proposed Plan of Study for PhD program		
Term	**Course**	**Credits**
Fall Year 1	GMS 5605 Medical Anatomy	3
	GMS 5606L Medical Anatomy Lab	2
	Curriculum & Instruction: Required Course	3
	GMS 6690 Molecular Cell Biology Journal Club	1
Spring Year 1	GMS 5630 Medical Histology	3
	GMS 5057 Medical Cell Biology	3
	Curriculum & Instruction: Required Course	3
	GMS 6690 Molecular Cell Biology Journal Club	1
Summer Year 1	GMS 6607C Musculoskeletal Systems	4

	GMS 7979 Advanced Research	2
Fall Year 2	GMS 5604 Medical Human Embryology	3
	Education Research: Required Course	3-6
	GMS 7979: Advanced Research	0-2
	GMS 6690 Molecular Cell Biology Journal Club	1
Spring Year 2	GMS 5613 Medical Human Anatomy by Diagnostic Imaging	2
	Educational Research: Required Course	3-6
	Anatomy and Biomedical: Elective Course	0-6
	GMS 7979: Advanced Research	0-2
	GMS 6690 Molecular Cell Biology Journal Club	1
Summer Year 2	GMS 6940 Supervised Teaching	3
	GMS 7979 Advanced Research	3
Fall Year 3	C&I / Educational Research: Elective Course	0-3
	Anatomy and Biomedical: Elective Course	0-6
	GMS 6690 Molecular Cell Biology Journal Club	1
	GMS 7980 Research for Doctoral Dissertation	2-5
Spring Year 3	C&I / Educational Research: Elective Course	0-3
	Anatomy and Biomedical: Elective Course	0-6
	GMS 6690 Molecular Cell Biology Journal Club	1
	GMS 7980 Research for Doctoral Dissertation	2-5
Summer Year 3	GMS 6940 Supervised Teaching	3
	GMS 7980 Research for Doctoral Dissertation	6
Fall Year 4	GMS 6940 Anatomy Teaching Practicum	3
	GMS 6690 Molecular Cell Biology Journal Club	5
	GMS 7980 Research for Doctoral Dissertation	1
Spring Year 4	GMS 6940 Supervised Teaching	3
	GMS 6690 Molecular Cell Biology Journal Club	1
	GMS 7980 Research for Doctoral Dissertation	5
Summer Year 4	GMS 7980 Research for Doctoral Dissertation	9
if necessary		

Fall Year 5	GMS 7980 Doctoral Research	9
if necessary		
Spring Year 5	GMS 7980 Doctoral Research	9
if necessary		

B. Provide a one- or two-sentence description of each required or elective course.

Science Courses

GMS 5604: Medical Human Embryology (3 credits)
This online course provides the basis for the development of the organs of human body.

GMS 5605: Medical Anatomy (3 credits)
This online course uses regional and system-based approaches to teach the organization of the anatomy of the human body.

GMS 5606L: Medical Anatomy Lab (2 credits)
This online laboratory course uses images of human dissections to study the anatomy of the human body.

GMS 5613: Medical Human Anatomy by Diagnostic Imaging (2 credits)
This online course is a systematic approach to visualizing by ultrasound, X-ray, MRI, and CAT the organization of the major structures within the human body.

GMS 5630: Medical Histology (3 credits)
This online course is designed to cover the histology of tissues and organs through lectures and chat sessions.

GMS 5057: Medical Cell Biology (3 credits)
Focus on the basics of cellular structure and function in the context of human health and disease.

GMS 6421: Cell Biology (4 credits)
This course will examine the most recent advances in cell biology by lecture and small group discussions of current publications from high impact cell biology journals.

GMS 6691: Special Topics in Cell Biology and Anatomy (3 credits)
This onsite course will examine the deficiencies and abnormalities of the cell that occur in various diseased conditions.

GMS 6400C: Principles of Physiology (6 credits)
This course teaches the functions of the human body at a level required for clinical

medicine. This course covers normal physiology, as well as selected diseases. The ultimate goal is for students to develop an understanding of the integrated functions of the normal body and 'problem solving' and 'critical thinking' skills in evaluating clinical situations.

GMS 6007: Fundamentals of Neuroscience (2 credits)
This course covers the basic background required to understand current topics in the field of Neuroscience, a rapidly changing area that impacts several fields of medicine including public health, public policy, and sports medicine, as well as on the military and pharmaceutical industry.

GMS 6705: Functional Human Neuroanatomy (4 credits)
This is a survey course in functional neuroscience, intended for a diverse group of graduate students. The course integrates basic neuroanatomy with systems neuroscience and cognitive neuroscience through lectures, lab work, textbook and lab atlas, and websites.

GMS 6607C: Musculoskeletal Systems (4 credits)
This course includes laboratory dissections to explore the anatomical features of the human body.

GMS 6690: Molecular Cell Biology Journal club (1 credit)
The students will read and present to the class findings of recent articles in medical education.

GMS 6940: Supervised Teaching (3 credits)
This onsite course is currently being designed for the PhD program. The student will assist in the all aspects of instruction and assessment in Gross Anatomy, Histology, or Cell Biology.

GMS 7979: Advanced Research (1-6 credits)
This course of independent research will be taken prior to the doctoral qualifying exam. The student will have picked a mentor and a committee to guide this research.

GMS 7980: Research for Doctoral Dissertation (3-9 credits)
Upon completion of the qualifying doctoral exam, the student will continue their mentored doctoral research project under this course.

Education & Research Courses

EDG 6356: Teaching, Learning, and Assessment (3 credits)
Historical and in-depth exploration of assessment practices related to curricular issues.

SCE 5140: Science Curriculum Development (3 credits)
Allows teachers to explore science curriculum development from theoretical and practical perspectives. Focuses on reform-based science curriculum and the research and science-specific pedagogical themes underlying their development.

SCE 5765: Data-Driven Science Instruction (3 credits)

Focusing on assessment of science instruction and learning. The course will include the study of research-based approaches to assessment, learning, and teaching.

EME 5207: Designing Technology-Rich Curricula (3 credits)
Extensive work in curriculum development utilizing instructional technologies. Contrasting views of curriculum development.

EME 5405: Internet in K-12 Instruction (3 credits)
Preparing preservice teachers, in-service teachers, and teacher educators to use the Internet.

EDG 6305: Multiple Perspectives on Teaching and Learning (3 credits)
Graduate seminar designed to provide a survey of major theoretical perspectives on learning and instruction, including classical and contemporary theories as well as emerging views.

EME 6065: Human-Computer Interaction and the Learner (3 credits)
Students will explore the interface between pedagogy, educational technology, cognitive science, graphic design, and software engineering, and define effective human-computer interaction.

EME 6458: Distance Teaching and Learning (3 credits)
This course explores forms of synchronous and synchronous interactive distance education from perspectives of theory and practice.

EME 6609: Instructional Design (3 credits)
Focuses on the application of instructional design principles to the development of instruction.

EDG 6931: Special Topics: “Teaching Adults” (3 credits)
The purpose of the course is to explore theory and practice related to teaching adult learners

EDF 6520: History of Education (3 credits)
Salient issues in education from the Reformation to the present.

EDF 6544: Philosophical Foundations of Education (3 credits)
Philosophical bases for democracy and education.

EDG 6017: Writing for Academic Purposes (3 credits)
This seminar is designed to enhance the capacity of advanced graduate students from all academic disciplines to write for academic purposes. It guides students through key rhetorical moves in academic writing --- working with what “they say”, presenting what “I say”, creating discursive flow, and editing/revising.

EDG 6931: Special Topics: Survey of Research Methods in STEM Education (3 credits)
Focusing on mixed method and designbased research, this advanced course is intended to develop an understanding of the foci and research methods used in STEM education.

EDG 7252: Perspectives in Curriculum, Teaching, and Teacher Education (3 credits)
This course involves a collaborative exploration of enduring issues related to curriculum and its

impact on teaching and learning in classrooms at all levels.

EDF 6402: Quantitative Foundations in Educational Research: Inferential Statistics (3 credits)
Analysis of variance: One-way ANOVA, two-way ANOVA, ANOVA, repeated measures, and split plot.

EDF 6403: Quantitative Foundations of Educational Research (6 credits)
Integrated coverage of fundamentals in the general field of education research. Includes statistics, experimental design, and data processing.

EDF 6471: Survey Design and Analysis in Educational Research (3 credits)
Development and analysis techniques for surveys and questionnaires. Techniques of protocol development, data collection, analysis, and reporting.

EDF 7412: Structural Equation Models (3 credits)
Confirmatory factor analysis and causal models**.**

EDF 7474: Multilevel Models (3 credits)
Models and methods for analysis of multilevel data.

EDF 7932: Multivariate Analysis in Educational Research (3 credits)
Review of selected studies, focusing on methods of data analysis. Emphasis on using multivariate techniques.

EDF 6475: Qualitative Foundations of Educational Research (4 credits)
Introduction to philosophical, historical, sociological, and other methodologies as aspects of qualitative educational research.

EDF 7479: Qualitative Data Analysis: Approaches and Techniques (3 credits)
Theories, approaches, and techniques of qualitative data analysis.

EDF 7483: Qualitative Data Collection: Approaches and Techniques (3 credits)
This course on qualitative data collection addresses both theoretical and practical dimensions of conducting qualitative research.

EDF 7486: Methods of Educational Research (3 credits)
Examination of research methodologies. Problem identification as well as organization and presentation of data.

EME 6059: Blended Learning Environments (3 credits)