THE OHIO STATE UNIVERSITY

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May 15, 2017

W. Randy Smith, Ph.D.
Vice Provost, Academic Programs
Council of Academic Affairs
Office of Academic Affairs
203 Bricker Hall
190 North Oval Mall
Columbus, OH 43210

RE: Proposal for Certificate of Study in Histotechnology

Dear Vice Provost Smith and members of the Council of Academic Affairs:

Please accept our proposal for the establishment of a Certificate of Study in Histotechnology originating from the Department of Pathology, College of Medicine. We request approval of these two new courses and the new certificate of study as an Undergraduate Academic Certificate Program (Credit): Post-Bachelor Degree. The certificate that we propose consists of two courses each at 12 semester credits, offered over two contiguous semesters to allow completion of the certificate in one year. We would like to enroll our first students in Fall of 2017.

This curriculum is proposed in response to an increasing need for specialized training to better prepare learners to work in both clinical and research lab environments. The specific skills that learners will acquire will prepare them for licensure and certification, following intensive year-long study with opportunities to demonstrate skills in efficiently and effectively performing basic and advanced microtomy, with various staining techniques, electron microscopy, and cytology, with use of special studies using immunofluorescence, immunohistochemistry, and in-situ hybridization. The proposed certificate of study responds to the need to attract highly-qualified technical staff currently in shortage at the Ohio State University Wexner Medical Center and elsewhere. The only other training program is Ohio is currently near Cleveland.

The curriculum requires specialized training and laboratory equipment. The Department of Pathology is committing funds through a $2.5 million dollar endowment in order to make this course of study feasible and affordable, underwriting the cost of faculty time, stains and laboratory equipment. The Department of Pathology, in collaboration with their clinical laboratory enterprise, with input from the Division of Medical Laboratory Sciences in the School of Health and Rehabilitation Sciences, also within the College of Medicine, has developed an excellent curriculum and proposed course syllabi in accordance with University and College policy.

The College of Medicine fully endorses this proposal. The curriculum has been reviewed and approved by members of the College Education Leadership Team, Marcia Nahikian-Nelms, Director of Academic Affairs, School of Health and Rehabilitation Sciences, and Cynthia Ledford, Assistant Dean for Curriculum Design and Innovation, College of Medicine, as well as Daniel Clinchot, Vice Dean for Education, College of Medicine. Please accept this proposal, its course syllabi, schedule, business plan, and letters of support.

We are happy to provide additional information as needed in order to expedite the approval process.

Respectfully,

Cynthia Ledford, M.D.
Assistant Dean for Curriculum Design and Innovation

Daniel M. Clinchot, M.D.
Vice Dean for Education
Associate Vice President for Health Sciences Education
Chair, Department of Biomedical Education and Anatomy
Professor of Physical Medicine and Rehabilitation

Attachments:
Proposal
Program Description (Appendix A)
Documentation of Support from Jessica Mantini (Appendix B)
Applications of Histological Theory and Techniques I Course Syllabus (Appendix C)
Weekly Schedule for Histological Theory and Techniques I Course (Appendix D)
Applications of Histological Theory and Techniques II Course Syllabus (Appendix E)
Weekly Schedule for Histological Theory and Techniques Ii Course (Appendix F)
Business Plan (Appendix G)
Letter of Support and Concurrence from School of Health and Rehabilitation Sciences (Appendix H)
Letter of Support from Chair of Pathology (Appendix I)

cc: Wendy Frankel, M.D., Chair of Pathology
Whitney Green, M.D.
Kathleen Tober, Ph.D.
Bonnie Whitaker, MT(HEW), HT(ASCP)QIHC
Lindsay Thorn, HTL(ASCP), Division of Medical Laboratory Sciences
Tammy Bannerman and Jessica Martini, School of Health and Rehabilitation Sciences
Marcia Nahikian-Nelms, Ph.D., RDN, LD, CNSC, FAND, Director of Academic Affairs

Proposal for Certificate of Study: Histotechnology
Undergraduate Academic Certificate: Post-Bachelor Degree
For licensure and accreditation as Histotechnologists

Department of Pathology Curriculum Development Committee
College of Medicine, Department of Pathology
Dr. Tatiana Oberyszyn (Tatiana.oberyszyn@osumc.edu)
Bonnie Whitaker (bonnie.whitaker@osumc.edu)
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Dr. Whitney Green (Whitney.green@osumc.edu)

Department of Pathology Financial Oversight Committee
Leslie Stump (leslie.stump@osumc.edu)
Kathleen Orians (Kathleen.orians@osumc.edu)
Dr. Wendy Frankel (Wendy.frankel@osumc.edu)

College of Medicine Curriculum Review Committee
College of Medicine, School of Health & Rehabilitation Sciences
Dr. Marcia Nahikian-Nelms (Marcia.nahikian-nelms@osumc.edu)
Jessica Mantini (Jessica.mantini@osumc.edu)
College of Medicine, Department of Internal Medicine
Dr. Cynthia Ledford (Cynthia.ledford@osumc.edu)
College of Medicine, Administration
Dr. Daniel Clinchot (Dan.Clinchot@osumc.edu)

College of Medicine NAACLS Accreditation Review Committee
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Dr. Tatiana Oberyszyn (Tatiana.oberyszyn@osumc.edu)
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Jessica Mantini (Jessica.mantini@osumc.edu)
College of Medicine, Department of Internal Medicine
Dr. Cynthia Ledford (Cynthia.ledford@osumc.edu)

Proposed Implementation Date
Autumn 2017

Academic Unit Responsible for Administering the Certificate Program
College of Medicine, Department of Pathology

Executive summary

The Department of Pathology is proposing a new certificate of study in Histotechnology as an undergraduate academic certificate program for students that have already earned a bachelors degree. The objective of this new certificate program is to prepare students to successfully sit for the NAACLS Histotechnologist Registry examination, to obtain NAACLS accreditation, and to create a pool of highly qualified histotechnologists. This new certificate program consists of two new courses each at 12 semester credits, offered over two contiguous semesters to allow completion of the certificate in 1 year. We would like to enroll our first students in Fall Semester of 2017.

Background

Accurate diagnosis by a pathologist requires high quality tissue procurement, processing, and analysis. With the advancement of clinical and research laboratory sciences, the need has also increased for highly specialized technologist to staff these laboratories. With the rapidly evolving field, additional areas of expertise are being defined each year and significant effort nationwide is occurring to recruit more young professionals to enter the field of medical laboratory science. While traditional biology and chemistry degrees cover much of the foundational sciences underpinning medical laboratory science and histotechnology, additional highly specialized laboratory skills are needed to prepare these future health professionals. The American Society for Clinical Pathologists (ASCP), serving clinical pathologist and laboratory professionals, has established scholarship and high school outreach programs to help address the projected workforce shortages. Locally, our department has a shortage of high quality applicants and a high turn over rate, both of which lead to sluggish turnaround times which ultimately leads to delays in patient treatment decisions. There are currently no NAACLS accredited Histotechnologist programs in OH, and there are only 8 in the entire country. Having our own certificate program allows us to train quality individuals for not only our own needs, but also the needs of other quality pathology departments nationwide. Ohio State University and its College of Medicine are well positioned to compete successfully for enrollment and placement into the workplace.

Bonnie Whitaker, Anatomic Pathology Operations Director, is responsible for new histotechnologist hires at the Ohio State University Wexner Medical Center. Since coming to OSU in 2008, Bonnie has struggled with identifying top candidates. Casual conversations between Bonnie, Dr. Frankel, and the department Chief administrative officer demonstrated a need for this program. In early 2016, the department has entered a hiring crisis and the program gained full support from the department.

Comparative Data

There are currently 8 NAACLS accredited Histotechnologist programs in the US; Barry University (Miami Shores FL), Beaumont Health System (Royal Oak, MI), Drexel University (Philadelphia, PA), Medical University of South Carolina (Charleston, SC), Sentara RMH School of Histotechnology (Harrisonburg, VA), University of Tennessee Health Science Center (Memphis, TN), University of Texas MD Anderson Cancer Center (Houston, TX), and West

Virginia University (Morgantown, WV). These programs offer Histotechnologist programs that are either standalone certificate programs or specializations within a BS or MS degree. As we are targeting in-person post-baccalaureate students, the best comparison programs are Drexel and Sentara. Drexel offers a 1-year masters program with integrated didactic and experiential learning. The NAACLS certification exam pass rate is 50% for students graduating from this program. Sentara offers a certificate program where the in-class and in-lab portions are separated, and had 100% of students in 2016 graduate and pass the registry exam.

In Ohio, there is 1 program that offers an NAACLS histotechnician program, Lakeland Community College. This program is offered as an associate's degree and prepares students to sit for the histotechnician (HT) registry exam. Between 2011 & 2015, 3 of the 4 students that opted to sit for the histotechnologist (HTL) exam passed and 14/17 passed the HT exam.

With a concentration of universities and medical centers in central Ohio and demand for quality histotechnologists, we anticipate that we will attract high quality post-baccalaureate students to our program.

Overall Curricular Design

What are the intended learning outcomes for the participants/learners within this curriculum?

Students will be taught according to the NAACLS certification guidelines. At the end of the program, they will have acquired the knowledge & practice to successfully sit for the Board examination. They will be instructed on the clinical significance, protocols, and troubleshooting techniques for the following areas:

- Laboratory safety, management, and regulatory oversight
- Quality control, Instrument maintenance, and basic laboratory mathematics and chemistry
- Basic anatomy & histology for the purpose of tissue identification
- Tissue procurement, processing, fixation, and embedding
- Tissue microtomy, histology, immune/enzyme histochemistry
- Light & electron microscopy
- Professional conduct, continuing professional development, and communication
- Administration, supervision, and education of users & providers of laboratory services

How will you know whether learners are on track? How will learners respond to feedback?

- Formative Assessments - Daily interaction in the lab between students and trained staff provides an opportunity to for frequent assessment and feedback regarding student progress.
- Students not demonstrating a clear understanding of the material will be offered additional instruction.

What opportunities do/can learners have to perform or demonstrate learning?

- Within each course we will use timely assessments, including weekly knowledge exams and practical exams. Non-passing scores, below preset minimum standard, will result in a requirement for review and re-test.
- Course final assessments – Courses will end with culminating written and practical exams.

Overall Program Evaluation and Continuous Improvement

How will success of the program be measured? (See original goals)

- Overall success will be measured by successful completion of the American Society for Clinical Pathology Board of Certification Exam.

How will learning be assured?

- We have established learning goals and objectives
- The curriculum aligns with the goals and objectives
- Using a mastery learning approach, timely assessments are used throughout the courses, with knowledge and practical exams, and frequent observation and feedback during laboratory time that is supervised by laboratory professionals. Non-passing scores, below preset minimum standard, will result in a requirement for review and re-test. We will also institute cumulative semester exams and upon completion of the certificate program learners will sit for a board certification exam.

How will faculty/peers provide input? How will students provide input?

- We will use the OSU student evaluation forms for students to provide input
- We will use peer evaluations for faculty/peers to provide input

Specific actions and any corollary issues:

Upon embarking on this endeavor, we explored how we might implement such a certificate of study in collaboration between the Department of Pathology and the Division of Medical Laboratory Sciences (MLS) within the School of Health and Rehabilitative Sciences. One of the biggest challenges in implementing such a program is the laboratory costs and access to meaningful clinical and laboratory experiences with state-of-the-art technologies. We did not want to unduly burden enrollees with these costs given their typical salary of ~$50,000. Fortunately, our colleagues in MLS were happy to offer accreditation and curriculum advice and defer implementation with the Department of Pathology. All of our faculty teachers identified in submitting this curriculum are within the Department of Pathology, which includes the clinical laboratory enterprise of Ohio State University Wexner Medical Center. This has also allowed for

some creative financing through a departmental endowment fund. As further steps to control costs and increase both accessibility and affordability to students seeking this career path, we have asked that this post-Baccalaureate certificate of study be listed as undergraduate credit. The content of this curriculum does not overlap other courses in the city. We do not anticipate that this program will affect faculty, staff or students outside the Department of Pathology.

Relationships to Other Programs

There is no overlap in the scope or substance of this program with any other unit at OSU.

Department of Pathology - Students will be trained in both clinical and research lab space, requiring that staff accommodate, interact with, and potentially help train these students.

NAACLS – Implementation of this program will involve the NAACLS accrediting body to oversee the process.

School of Health and Rehabilitation Sciences - Undergraduate students in the Medical Laboratory Sciences program may find this program to be of interest as a combined MLS and HTL certification could potentially generate additional pay when entering the workforce. We have consulted with Jessica Mantini, MLS program director, for her input into the accreditation process and Dr. Marcia Nahikian-Nelms, Director of Academic Affairs, for her input on curriculum design. Both Jessica (Appendix B) and Dr. Nahikian-Nelms (Appendix H) have expressed their support for the implementation of this program.

Previous Submissions

This certificate program has not previously been submitted.

Student Enrollment

The Histotechnologist Certificate program is expected to attract students interested in becoming medical professionals, who function behind the scenes in a laboratory setting. This may include undergraduate students majoring in science fields, certified medical laboratory scientists, and laboratory technicians.

It is projected that a minimum of 2 students will enroll in this program annually.

Graduates from this program will have the opportunity to obtain a job in hospitals, veterinary pathology labs, private pathology labs, or research labs.

Program approval overview

Department of Pathology Curriculum Development Committee

Tatiana Oberyszyn, Bonnie Whitaker, Kathleen Tober, Whitney Green have met bi-weekly since September of 2016 to develop the curriculum.

College of Medicine NAACLS Accreditation Review Committee

Jessica Mantini has reviewed the initial curriculum and has offered to help with the

accreditation process

College of Medicine Curriculum Review Committee

Marcia Nahikian-Nelms, Cynthia Ledford, and Daniel Clinchot have reviewed the curriculum.

Program Needs Assessment and Approval Process

In response to a histotechnologist (HTL) hiring crisis in the spring of 2016, Bonnie Whitaker, Anatomic Pathology Operations Director in the Department of Pathology, initiated conversations with Dr. Frankel, chair of the department of Pathology, and the Leslie Stump, the department of pathology chief administrative officer about the creation of the HTL certificate program. Bonnie was granted full support from the department in the fall of 2016 at which time she created the course design including the syllabus for the certificate program. Bonnie and Dr. Frankel then enlisted Dr. Whitney Green to serve as the lead pathology faculty representative; Tania Oberyszyn, PhD to oversee the program, and Kathleen Tober, PhD to help with curriculum design and implementation. This newly formed curriculum development committee has met biweekly since September 2016 with the sole purpose of developing the content to be delivered to students.

In February of 2017, Jessica Mantini, director of the NAACLS accredited Medical Laboratory Science program in the School of Health & Rehabilitation Sciences, was contacted to gain insight into accreditation. She has offered her full support to the HTL certificate program throughout the process of accreditation. In April of 2017, Dr. Cynthia Ledford, college of medicine assistant dean for curricular design and innovation, and Dr. Marcia Nahikian-Nelms, School of Health and Rehabilitation Sciences director of coordinated dietetic education programs, were consulted for direction in moving the curriculum into a formal certificate program. The support of both Dr. Ledford and Dr. Nahikian-Nelms has been instrumental in the development of this proposal.

Formal review of the HTL certificate curriculum began with approval of the following members of the department of Pathology – Bonnie Whitaker, Dr. Kathleen Tober, Dr. Tatiana Oberyszyn, and Dr. Whitney Green. Dr. Frankel, chair of the department of Pathology, granted formal department approval of the proposed certificate program (Appendix I).

In April 2017, the College Education Leadership Team members were approached regarding what steps were needed for review and approval at the College and University level. Marcia Nahikian-Nelms, Director of Academic Affairs for all programs in the School of Health and Rehabilitative Sciences and Cynthia Ledford, Assistant Dean for Curriculum Design and Innovation met with the faculty and subsequently reviewed and approved this proposal in May. See also letters of support (Appendix H & J).

Formal approval from the College was subsequently received, after final curriculum design was completed. See cover letter.

Available Resources

The Department of Pathology is committed to setting up this program and has received approval by the OSU Board of Trustees at the April 2017 meeting to set up an endowment fund via its practice plan, OSU Pathology Services, LLC, with some of its cash reserves. Dr. Frankel, the department Chair, desires to use 100% of the investment income from this endowment to fund the setup of the Histotechnologist program in year one, and 50% of the annual investment income each year thereafter for the operation of the program.

The department has received approval to transfer funding to the principle endowment fund of $2.5 Million for which the annual investment income is sufficient to cover the annual costs of the program. Laboratory and classroom space has been identified; program will utilize currently available equipment, and currently employed faculty and staff are excited for the opportunity to teach students who enroll in this program. Please see Appendix G for the five year business plan.

Supporting Documents

College's Cover Lettter of Approval from Drs. Ledford and Clinchot

Appendix A: Program Description
Appendix B: Documentation of support from Jessica Mantini
Appendix C: Application of Histological Theory and Techniques I Course Description
Appendix D: Application of Histological Theory and Techniques I Course Syllabus
Appendix E: Application of Histological Theory and Techniques I Course Description
Appendix F: Application of Histological Theory and Techniques I Course Syllabus
Appendix G: Business Plan
Appendix H: Letter of Support from Dr. Nahikian-Nelms
Appendix I: Letter of Support from Dr. Frankel

Appendix A

The Ohio State University College of Medicine
Histotechnologist Certificate Program

Purpose: The Histotechnologist Certificate Program is designed to provide post-baccalaureate students with in-depth knowledge of both the theory and practice of histotechnology. Upon successful completion of this certificate program, students will be able to identify, process, embed, cut & stain human tissue and to sit for the ASCP histotechnologist (HTL) registry exam.

Required Courses (24 credit hours)
PATHOLOGY XXXX: Application of Histological Theory and Techniques I (12)
PATHOLOGY XXXX: Application of Histological Theory and Techniques II (12)

Grades Required
Minimum C for each course to receive a certificate

Appendix B

From: Mantini, Jessica **Sent:** Wednesday, January 04, 2017 11:19 AM **To:** Whitaker, Bonnie **Subject:** RE: Histology training program

Hey Bonnie,

Can you tell me where exactly you guys are in the process with NAACLS? Have you submitted a letter of intent or formal application yet? Or are you just planning ahead? Then I can better answer what all you will need. In the end it will be much more than this! They love documentation at NAACLS!

As for what you have, I have never actually seen a submission for initial program approval so I can't say 100% but for the weekly outline I think this is more than enough detail. I would maybe make sure that everything you list on the grading rubric in the syllabus directly appears in the schedule. I really like the how can I make a difference case studies! A note on the objectives in the syllabi: My experience which accreditation is that they are very picky about these. And they like to see many Level 3 Cognitive Domain objectives. Not sure if it will be different for a HST program but in case you need to build them up a bit here is a document that can be helpful: https://ctl.tedu.edu.tr/sites/default/files/content_files/docs/writing-objectives.pdf

Few other random things:

- Toward the end of the syllabi there is some stuff from mine that references our program handbook which you probably meant to remove.
- The university just sent us notice saying that we are no longer allowed to request doctors notes from students with minor illnesses. So we have to remove any reference to that type of documentation
- I am assuming you guys have to have students enroll in coursework as any typical OSU student would correct? That means that since this material goes over 6 months you will have to get it firmly fit within two 14-week courses and they will have to be 2 distinctive courses with different syllabi.

Hope that makes sense. Give me a call if you need to. Let me know again where you are (if anywhere) in the NAACLS process and I can give you more guidance on what you will have to prepare for submission. I would strongly recommend somebody attend a NAACLS workshop before submitting. There will be one at the end of February in Boston: http://naacls.org/News/Workshops.aspx

Jessica Mantini, MS, MLS(ASCP) Program Director · The Ohio State University · School of Health and Rehabilitation Sciences · Medical Laboratory Science Division · 453 W. 10th Avenue · Columbus, OH 43210 (614) 366-7677

From: Whitaker, Bonnie
Sent: Wednesday, December 14, 2016 1:13 PM
To: Mantini, Jessica <Jessica.Mantini@osumc.edu>
Cc: Bannerman, Tammy <Tammy.Bannerman@osumc.edu>
Subject: Histology training program

Hi Jessica,

I wanted to send these for your review. I'd appreciate it if you would let me know if these need more detail, or less detail. Also, please let me know what else I need to prepare, in order to submit these for consideration as a certificate program.

Thanks,
Bonnie

Bonnie P. Whitaker
AP Operations Director

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Appendix C

The Ohio State University
College of Medicine
Department of Pathology

COURSE TITLE:	Application of Histological Theory and Techniques I
DESCRIPTION:	Technical methods and procedures for use in Clinical and Research Histology
COURSE DIRECTOR:	Tatiana Oberyszyn, PhD
INSTRUCTORS:	Whitney Green, MD Kathleen Tober, PhD Bonnie Whitaker, MT (HEW), HT (ASCP) QIHC Lindsay Thorn, HTL (ASCP)
DATE AND TIME:	Fall Semester 2017 Program will be 20 hours per week in lecture or lab, with additional practice time, as required
PREREQUISITES:	Admission to Histology program; BS or BA (with minimum of 30 semester hours of a combination of biology and chemistry); Completion of Clinical Lab Orientation & Training; Completion of Computer Based Learning Activities.
REQUIRED TEXTS:	Carson & Hladik Cappellano. (2015). Histotechnology: A Self-Instructional Text (4th ed.) American Society for Clinical Pathology Press ISBN: 978-0891896319 Carson. (2014). Histotechnology: A Self-Assessment Workbook (3rd ed.) American Society for Clinical Pathology Press ISBN: 978-0891896401 Suvarna, Layton & Bancroft. (2013) Bancroft's Theory and Practice of Histological Techniques (7th ed.) Churchill Livingstone ISBN: 978-0702042263 Mescher. (2016). Junqueira's Basic Histology (14th ed.) McGraw Hill ISBN: 978-0071842709
COURSE GOALS:	The goals of this course are to give the entry-level histology student a comprehensive understanding of lab safety & regulatory compliance; a working knowledge of basic histology & medical terminology; and skill set to efficiently and effectively grossly identify, process, fix, embed, and perform microtomy on tissue specimens in both a clinical and a research lab environment. These skills will be acquired through participation in laboratory demonstrations and exercises, as well as repetition to perfect each new skill.

COURSE OBJECTIVES FOR APPLICATION OF HISTOLOGICAL THEORY AND TECHNIQUES:

1. Demonstrate knowledge of proper safety, infection control, and regulatory practices in the clinical laboratory setting.
2. Gain a basic understanding of laboratory and pathology medical terminology
3. Perform simple gross dissection
4. Identify normal versus abnormal tissues
5. Load and operate tissue processors
6. Perform microtomy on all tissue types, and at different tissue thicknesses
7. Identify normal versus abnormal tissues at the microscopic level

ASSESSMENT:

Baseline knowledge of each section will be determined using written and practical pre-testing methodologies. Students will then be provided with clear learning objectives and deliberate skills practice focused on those objectives. Students will be given feedback on formative assessments (given by either peers or faculty) and provided time outside of the formal lecture/lab structure to work on mastering deficiencies. Finally, students will be evaluated and grades will be given based on practical and written exercises. Grades will be assigned as follows:

Any final grade below a C- is considered unacceptable. A certificate will not be issued, and we will not provide documentation of laboratory experience for use with American Society of Clinical Pathology Board of Certification for Histology Technician or Histology Technologist.

The Program will be graded as follows:

Lab Assignment/Evaluation	**Percentage of Final Grade**
Section Written Exams	25%
Medical Terminology & Lab Safety	3%
Making Solutions	3%
Tissue Processing, fixatives, fixation	3%
Normal Tissue Histology (3)	3%
Tissue Embedding	3%
Microtomy	4%
Microtomy Troubleshooting	3%
H&E, manual coverslipping	3%
Section Practical Exams	20%
Making Solutions	4%
Tissue Embedding	4%
Microtomy	4%
Microtomy Troubleshooting	4%
Frozen Section Microtomy	4%
Professionalism & Responsibility	10%
Special Projects	5%
Semester Comprehensive Practical	20%
Semester Comprehensive Exam	20%

Grades will be assigned by the following percentages:

Grade	%		Grade	%
A	92.45-100		B-	79.45-82.44
A-	89.45-92.44		C+	76.45-79.44
B+	86.45-89.44		C	72.45-76.44
B	82.45-86.44		C-	69.45-72.44

Professionalism & Responsibility

Professionalism expectations: Follows the Med Center and the Pathology and Laboratory Medicine policies regarding attendance and dress code; exhibits good manners and etiquette; demonstrates an ability to work, share equipment and communicate with others; listens to directions; completes assignments; accepts constructive criticism; organizes work flow effectively and efficiently; follows safety procedures, as well as all applicable laboratory policies and procedures. These traits are required of a highly functioning histology technician or technologist.

Examples of responsibility expectations: being able to implement verbal and written instructions, taking care of lab equipment properly, keeping clean lab environment, disposing of waste, restocking supplies, completing work independently, etc.

ATTENDANCE POLICY:

Because this course is a building process, attendance in lab is essential. Students will not routinely be allowed to make-up the work. If an exam is given, or something is due the day you miss, a grade of 0 will be given. When there are *extreme extenuating* circumstances, please see the course director. Instructor must be notified of absences IN ADVANCE giving as much notice as possible. It is rarely possible for make-up labs to be equivalent to what was seen/done in the original class due to the instructors' availability. Assignments missed for unexcused absences will be assigned a grade of 0.

Students who miss more than 10 days for **ANY** reason will be dropped from the course. This will result in the student receiving an E or a W depending on the time/situation. Missing more than 30 minutes of any one lab will be considered an absence. Since repetition of daily instructions to late students is difficult, students who are late to class will NOT be given any remedial directions or missed materials. Student should make plans to arrive at their designated location at least 10 minutes prior to the scheduled start time for the activity.

Students who are habitually (less than 15 minutes) late will assigned the following attendance record: 2 late labs (between 1and 15 minutes) = 1 absence. Students should not begin to prepare materials for the day's lab until all instructions have been given.

If you are late for an exam or practical, you will have only the amount of time remaining to complete the exam. Early or late laboratory practical exams will NOT be given. If you believe you have **extenuating** circumstances, please see the course director. The quality of specimens for approved make-up practical cannot be guaranteed equal to the original.

SPECIAL NEEDS:

Students with special needs should notify the Office of Disability Services so that the appropriate arrangements may be made through the instructor. This must be done in advance of any anticipated issues (exams, etc.).

STUDENT CONDUCT:

Please refer to the Student Handbooks and the OSU Student Code of Conduct for details about the expectations for behavior in the classroom. The HT program reserves the right to place students under professional probation if their conduct in the classroom (attendance, participation, drug use, inappropriate comments, unprofessional conduct) makes students uncomfortable, or any other attitude/behavior impedes the learning process of the student or his/her classmates. Let's strive for an environment where those who want to learn can do so while maintaining a positive and respectful environment for both student and teacher.

ACADEMIC MISCONDUCT:

Any activity that compromises the academic integrity of The Ohio State University, or subverts the education process will not be tolerated. For further explanation and action see Code of Student Conduct, Prohibited Conduct (3335-23-04). Academic integrity is essential to maintaining an environment that fosters excellence in teaching, research, and other educational and scholarly activities. Thus, The Ohio State University and the Committee on Academic Misconduct (COAM) expect that all students have read and understand the University's *Code of Student Conduct*, and that all students will complete all academic and scholarly assignments with fairness and honesty.

The Ohio State University's *Code of Student Conduct* (Section 3335-23-04) defines academic misconduct as: "Violation of course rules as contained in the course syllabus or other information provided to the student; Knowingly providing or receiving information during examinations such as course examinations and candidacy examinations; or the possession and/or use of unauthorized materials during those examinations; Knowingly providing or using unauthorized assistance in the laboratory, on field work, in scholarship or on a course assignment; Submitting plagiarized work for an academic requirement. Plagiarism is the representation of another's work or ideas as one's own; it includes the unacknowledged word-for-word use and/or paraphrasing of another person's work, and/or the inappropriate unacknowledged use of another person's ideas; Submitting substantially the same work to satisfy requirements for one course or academic requirement that has been submitted in satisfaction of requirements for another course or academic requirement without permission of the instructor of the course for which the work is being submitted or supervising authority for the academic requirement; Falsification, fabrication, or dishonesty in creating or reporting laboratory results, research results, and/or any other assignments; Serving as, or enlisting the assistance of, a substitute for a student in any graded assignments; Alteration of grades or marks by the student in an effort to change the earned grade or credit; Alteration of academically-related

university forms or records, or unauthorized use of those forms or records; Engaging in activities that unfairly place other students at a disadvantage, such as taking, hiding or altering resource material, or manipulating a grading system; and Violation of program regulations as established by departmental committees and made available to students.."

Examples of academic misconduct include (but are not limited to) plagiarism, collusion (unauthorized collaboration), copying the work of another student, and possession of unauthorized materials during an examination.

Ignorance of the University's *Code of Student Conduct* is never considered an "excuse" for academic misconduct, so I recommend that you review. Students must recognize that failure to follow the rules and guidelines established in the University's *Code of Student Conduct* and this syllabus may constitute "Academic Misconduct."

Any student found to be suspicious of misconduct during an exam will be asked to stop taking the exam and the matter will be forwarded to COAM for decision on how to proceed.

The *Code of Student Conduct* and, specifically, the sections dealing with academic misconduct state that if I suspect that a student has committed academic misconduct in this course, I am obligated by University Rules to report my suspicions to the Committee on Academic Misconduct. If COAM determines that you have violated the University's *Code of Student Conduct* (i.e., committed academic misconduct), the sanctions for the misconduct could include a failing grade in this course and suspension or dismissal from the University.

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- The Committee on Academic Misconduct web pages (oaa.osu.edu/coam/home.html)
- *Ten Suggestions for Preserving Academic Integrity* (oaa.osu.edu/coam/ten-suggestions.html)
- *Eight Cardinal Rules of Academic Integrity* (www.northwestern.edu/uacc/8cards.html)

ELECTRONIC DEVICES:

The use of electronic devices of any kind are strictly prohibited during all Laboratory classes. Anyone found to be using a cell phone, iPod, smartphone, PDA device, etc. for ANY reason (texting, music, internet, camera, etc.) will be asked to leave immediately and a 0% will be assigned for any assignments/exams/labs being done that day. Such devices MUST be left in a locker outside the classroom.

Appendix D

Application of Histological Theory and Techniques I

Week 1

- **Lecture**
  - Course Overview, Discuss Syllabus & Reading List
  - Lab Safety Training
  - Overview of the Histology Laboratory: The Lab's Purpose and Functions
  - Laboratory/Pathology Medical Terminology
  - All Water is Not the Same
  - Microscope Session; Where Are You In Your Histology Knowledge Base
  - Professional Conduct
- **Lab**
  - Orientation
  - Weights and Measurements in the Laboratory
  - Basic Lab Skills

Week 2

- **Lecture**
  - Case Study: How You Can Make a Difference
  - Labeling Everything from Patient Samples to Reagents Received
  - Fixatives
  - Tissue Processing
- **Lab**
  - Observe grossing
- **Written Test** - Medical Terminology & Lab Safety
- **Practical Test** - Making Solutions

Week 3

- **Lecture**
  - Microscope Session - Histology
  - Tissue Embedding
- **Lab**
  - Fixation of non-tissue proteins and recorded observations
  - Hand process specimens
  - Prepare tissue that is properly fixed for processing and tissue that is improperly fixed for processing (autopsy tissue) and run on tissue processor
  - Run tissues on wrong tissue processing protocol (large tissue on biopsy protocol)
  - Choosing processor protocols - gross room
  - Embedding observation
- **Written Test** - tissue processing, fixatives and fixation

Week 4

- **Lecture**
  - Microscope Session - Histology
  - Case Study – Embedding and it's importance
- **Lab**
  - Embedding practice
  - Observe Grossing
  - Embedding practice

Week 5

- **Lecture**
  - Microscope Session - Histology
- **Lab**
  - Embedding - patient specimens with a technologist
  - Procure autopsy tissue, section, fix, process and embed at least 10 tissues/4 blocks each - Liver, colon, lung, skin, muscle, uterus or prostate, artery, esophagus, kidney, brain
- **Written Test** - Normal tissue histology

Week 6

- **Lecture**
  - Microscope Session - Histology
  - TBD -
  - Semester Project Discussion
- **Lab**
  - Embedding - patient specimens with a technologist
- **Written & Practical Test** - Tissue embedding

Week 7

- **Lecture**
  - Microscope Session - Histology
  - TBD -
  - Mictrotomy
  - Semester Project Idea Due
- **Lab**
  - Observation in microtomy
  - Practice microtomy on blank blocks and practice tissue
  - Practice microtomy on practice tissue, and then on tissue procured from Autopsy during week 5

Week 8

- **Lecture**
  - Microscope Session - Histology
  - TBD -
  - Case Study – Microtomy
  - Professional Conduct
- **Lab**
  - Practice microtomy on practice tissue, and then on tissue procured from Autopsy during week 5
  - Work on Semester Project

Week 9

- **Lecture**
  - Microscope Session - Histology
  - TBD -
- **Lab**
  - Work on Semester Project

Week 10

- **Lecture**
  - Microscope Session - Histology
  - TBD -
- **Lab**
  - Microtomy practice on practice tissue until approved to start cutting autopsies and placentas
  - Work on Semester Project
- **Written Test** - Normal tissue histology

Week 11

- **Lecture**
  - Microscope Session - Histology
  - TBD -
- **Lab**
  - Microtomy - autopsies and placentas
  - Work on Semester Project
- **Practical Test - Microtomy**

Week 12

- **Lecture**
  - Microscope Session - Histology
  - TBD
  - Troubleshooting Microtomy
- **Lab**
  - Microtomy troubleshooting
  - General microtomy practice
  - Work on Semester Project
- **Written Test** - troubleshooting microtomy
- **Practical Test** - troubleshooting microtomy

Week 13

- **Lecture**
  - Microscope Session - Histology
  - The Frozen Section Lab and Cryotomy
  - The Hematoxylin and Eosin (H&E) Stain
- **Lab**
  - Observation in the Frozen Section Lab
  - Microtomy, as needed to produce slides for manual H&E staining with different H&E methods
  - Observation in staining area
  - Manual H&E staining (stain tissues cut during microtomy practice sessions)
  - Manual H&E Staining with different H&E methods

Week 14

- **Lecture**
  - Microscope Session
  - TBD
  - Why Coverslip?
  - Case Study – Frozen Sections
- **Lab**
  - Observation of automated coverslipper
  - Practice manual coverslipping techniques
  - Practice frozen sectioning
  - Staining frozen sections with H&E stain and hand coverslipping
- **Written & Practical Test** – H&E, manual coverslipping

Week 15

- **Lecture**
  - Microscope Session - Histology
  - TBD
  - What Are My Career Options?
- **Lab**
  - Observation in renal pathology IF lab
  - Tissue processing and embedding
  - Microtomy and Embedding
  - Work on Semester Project
- **Written Test** - Normal tissue histology
- **Practical Test** - frozen section microtomy

EXAM WEEK

- **Written Semester Exam**
- **Practical Semester Exam**
- **Semester Project due**

Appendix E

The Ohio State University
College of Medicine
Department of Pathology

COURSE TITLE:	Application of Histological Theory and Techniques II
DESCRIPTION:	Technical methods and procedures for use in Clinical and Research Histology
COURSE DIRECTOR:	Tatiana Oberyszyn, PhD
INSTRUCTORS:	Whitney Green, MD Kathleen Tober, PhD Bonnie Whitaker, MT (HEW), HT (ASCP) QIHC Lindsay Thorn, HTL (ASCP)
DATE AND TIME:	Spring Semester 2018 Program will be 6 hours per week in lecture and 18 hours per week in lab.
PREREQUISITES:	Admissions to Histology program; BS or BA (with minimum of 30 semester hours of a combination of biology and chemistry) Application of Histological Theory and Techniques I
REQUIRED TEXTS:	Carson & Hladik Cappellano. (2015). Histotechnology: A Self-Instructional Text (4th ed.) American Society for Clinical Pathology Press ISBN: 978-0891896319 Carson. (2014). Histotechnology: A Self-Assessment Workbook (3rd ed.) American Society for Clinical Pathology Press ISBN: 978-0891896401 Suvarna, Layton & Bancroft. (2013) Bancroft's Theory and Practice of Histological Techniques (7th ed.) Churchill Livingstone ISBN: 978-0702042263 Mescher. (2016). Junqueira's Basic Histology (14th ed.) McGraw Hill ISBN: 978-0071842709
COURSE GOALS:	The goals of this course are to provide the entry-level histology student with the skills to efficiently and effectively perform special stains, understand basic electron microscopy, immunohistochemistry, and clinical laboratory compliance. These skills will be acquired through participation in laboratory demonstrations and exercises, as well as repetition to perfect each new skill.

COURSE OBJECTIVES FOR APPLICATION OF HISTOLOGICAL THEORY AND TECHNIQUES:

1. Perform and troubleshoot H&E and special stains, both manually and using automation
2. Perform and troubleshoot placing coverslips on stained sections, both manually and using automation
3. Perform and troubleshoot frozen section microtomy.
4. Understand the basic principals of electron microscopy.

ASSESSMENT:

Baseline knowledge of each section will be determined using written and practical pre-testing methodologies. Students will then be provided with clear learning objectives and deliberate skills practice focused on those objectives. Students will be given feedback on formative assessments (given by either peers or faculty) and provided time outside of the formal lecture/lab structure to work on mastering deficiencies. Finally, students will be evaluated and grades will be given based on practical and written exercises. Grades will be assigned as follows:

Any grade below a C- is considered unacceptable. A certificate will not be issued, and we will not provide documentation of laboratory experience for use with American Society of Clinical Pathology Board of Certification for Histology Technician or Histology Technologist.

The Program will be graded as follows:

Lab Assignment/Evaluation	**Percentage of Final Grade**
Section Written Exams	25%
Carbs & Amyloid Staining	3%
Muscle & Connective Tissue Stains	2%
Nucleic Acid & Polychromatic Stains	2%
Microorganism Stains	3%
Pigment, Mineral, Cytoplasmic Stains	2%
Enzyme Histochemistry in Muscle	2%
Electron Microscopy	2%
Immunology & IHC	3%
IHC Markers	2%
ISH & Molecular Path	2%
Quality & Compliance	2%
Section Practical Exams	20%
Carbs & Amyloid	2%
Muscle & Connective Tissue Stains	2%
Nucleic Acid & Polychromatic Stains	2%
Microorganism Stains	5%
Pigment, Mineral, Cytoplasmic Stains	2%
Cytology Specimen Preparation	2%
IHC	5%
Professionalism & Responsibility	10%
Special Projects	5%
Semester Comprehensive Practical	20%
Semester Comprehensive Exam	20%

Grades will be assigned by the following percentages:

Grade	%		Grade	%
A	92.45-100		B-	79.45-82.44
A-	89.45-92.44		C+	76.45-79.44
B+	86.45-89.44		C	72.45-76.44
B	82.45-86.44		C-	69.45-72.44

Professionalism & Responsibility

Professionalism expectations: Follows the Med Center and the Pathology and Laboratory Medicine policies regarding attendance and dress code; exhibits good manners and etiquette; demonstrates an ability to work, share equipment and communicate with others; listens to directions; completes assignments; accepts constructive criticism; organizes work flow effectively and efficiently; follows safety procedures, as well as all applicable laboratory policies and procedures. These traits are required of a highly functioning histology technician or technologist.

ATTENDANCE POLICY:

Because this course is a building process, attendance in lab is essential. Students will not routinely be allowed to make-up the work. If an exam is given, or something is due the day you miss, a grade of 0 will be given. When there are *extreme extenuating* circumstances, please see the course director. Instructor must be notified of absences IN ADVANCE giving as much notice as possible. It is rarely possible for make-up labs to be equivalent to what was seen/done in the original class due to the instructors' availability. Assignments missed for unexcused absences will be assigned a grade of 0.

Students who miss more than 10 days for **ANY** reason will be dropped from the course. This will result in the student receiving an E or a W depending on the time/situation. Missing more than 30 minutes of any one lab will be considered an absence. Since repetition of daily instructions to late students is difficult, students who are late to class will NOT be given any remedial directions or missed materials. Student should make plans to arrive at their designated location at least 10 minutes prior to the scheduled start time for the activity.

Students who are habitually (less than 15 minutes) late will assigned the following attendance record: 2 late labs (between 1and 15 minutes) = 1 absence. Students should not begin to prepare materials for the day's lab until all instructions have been given.

If you are late for an exam or practical, you will have only the amount of time remaining to complete the exam. Early or late laboratory practical exams will NOT be given. If you believe you have **extenuating** circumstances, please see the course director. The quality of specimens for approved make-up practical cannot be guaranteed equal to the original.

SPECIAL NEEDS:

Students with special needs should notify the Office of Disability Services so that the appropriate arrangements may be made through the instructor. This must be done in advance of any anticipated issues (exams, etc.).

STUDENT CONDUCT:

Please refer to the Student Handbooks and the OSU Student Code of Conduct for details about the expectations for behavior in the classroom. The HT program reserves the right to place students under professional probation if their conduct in the classroom (attendance, participation, drug use, inappropriate comments, unprofessional conduct) makes students uncomfortable, or any other attitude/behavior impedes the learning process of the student or his/her classmates. Let's strive for an environment where those who want to learn can do so while maintaining a positive and respectful environment for both student and teacher.

ACADEMIC MISCONDUCT:

Any activity that compromises the academic integrity of The Ohio State University, or subverts the education process will not be tolerated. For further explanation and action see Code of Student Conduct, Prohibited Conduct (3335-23-04). Academic integrity is essential to maintaining an environment that fosters excellence in teaching, research, and other educational and scholarly activities. Thus, The Ohio State University and the Committee on Academic Misconduct (COAM) expect that all students have read and understand the University's *Code of Student Conduct*, and that all students will complete all academic and scholarly assignments with fairness and honesty.

The Ohio State University's *Code of Student Conduct* (Section 3335-23-04) defines academic misconduct as: "Violation of course rules as contained in the course syllabus or other information provided to the student; Knowingly providing or receiving information during examinations such as course examinations and candidacy examinations; or the possession and/or use of unauthorized materials during those examinations; Knowingly providing or using unauthorized assistance in the laboratory, on field work, in scholarship or on a course assignment; Submitting plagiarized work for an academic requirement. Plagiarism is the representation of another's work or ideas as one's own; it includes the unacknowledged word-for-word use and/or paraphrasing of another person's work, and/or the inappropriate unacknowledged use of another person's ideas; Submitting substantially the same work to satisfy requirements for one course or academic requirement that has been submitted in satisfaction of requirements for another course or academic requirement without permission of the instructor of the course for which the work is being submitted or supervising authority for the academic requirement; Falsification, fabrication, or dishonesty in creating or reporting laboratory results, research results, and/or any other assignments; Serving as, or enlisting the assistance of, a substitute for a student in any graded assignments; Alteration of grades or marks by the student in an effort to change the earned grade or credit; Alteration of academically-related university forms or records, or unauthorized use of those forms or records; Engaging in activities that unfairly place other students at a disadvantage, such as taking, hiding or altering resource material, or manipulating a grading system; and Violation of program regulations as established by departmental committees and made available to students.."

Examples of academic misconduct include (but are not limited to) plagiarism, collusion (unauthorized collaboration), copying the work of another student, and possession of unauthorized materials during an examination.

Ignorance of the University's *Code of Student Conduct* is never considered an "excuse" for academic misconduct, so I recommend that you review. Students must recognize

that failure to follow the rules and guidelines established in the University's *Code of Student Conduct* and this syllabus may constitute "Academic Misconduct."

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Appendix F

Application of Histological Theory and Techniques II

Week 1

- **Lecture**
  - Carbohydrates and Amyloid
  - Overview of Special Stains and IHC: Why We Need Them
  - Microscope Session - Special Stains Overview
  - Professional Conduct
- **Lab**
  - Making Reagents - A Review of Weighing and Measuring
  - Carbohydrates and Amyloid Stains
    - PAS
    - PAS with Diastase Digestion
    - Mucicarmine
    - Alcian Blue, pH 2.5
    - Alcian Blue, pH 1.0 Alcian Blue with hyaluronidase
    - Alcian Blue/PAS/Hematoxylin
    - Colloidal Iron
    - Congo Red
    - Crystal Violet

Week 2

Martin Luther King Day - No Classes

- **Lecture**
  - Microscope Session - Review of PAS, PAS/d and Mucicarmine slides
  - Microscope Session - Review of Alcian Blues, Colloidal Iron, Congo Red and Crystal Violet slides
  - Connective and Muscle Tissue
  - Microscope Session - Overview of Muscle and Connective Tissue Histology and Stains
- **Lab** - Muscle Tissue
  - Masson Trichrome
  - Gomori 1-Step Trichrome
  - Van Gieson Picric Acid-Acid Fuchsin Stain
  - Verhoeff Elastic Stain
  - Movat's Pentachrome Stain
  - Gomori Stain for Reticular Fiber
- **Written Test** - Carbohydrates and Amyloid Staining
- **Practical Test** - Carbohydrates and Amyloid

Week 3

- **Lecture**
  - Silver Staining Techniques
  - Microscope Session - Connective Tissue slides
  - Case Study: How You Can Make a Difference cases that depended upon special stains, in order to make the correct diagnose)
  - Basement Membrane Staining Techniques
  - Microscope Session - Muscle Tissue slides
- **Lab**
  - Additional Connective Tissue and Muscle Stains
    - Aldehyde Fuchsin Elastic Stain
    - Mallory PTAH for Cross-Striations and Fibrin
    - Periodic Acid-Methenamine Silver Procedure for Basement Membranes
    - Oil Red O for Neutral Fats
    - Toluidine Blue for Mast Cells
- **Written Test** - Muscle and Connective Tissue Staining
- **Practical Test** - Muscle and Connective Tissue Stains

Week 4

- **Lecture**
  - Nucleic Acid & Polychromatic Stains
  - Microscope Session - Connective Tissue and Muscle Stains
  - Microscope Session - Nucleic Acid and Polychromatic Stains
  - Microorganism Stains
  - Case Study – bone marrows
- **Lab**
  - Nucleic Acid and Polychromatic Stains
    - Feulgen Reaction
    - Methyl Green-Pyronin Y
    - Wright-Giemsa
    - May-Grunwald Giemsa
  - Microorganism Stains)
    - Gram Stain
    - Alcian Yellow-Toluidine Blue Stain for H. pylori
    - Modified Diff-Quik Giemsa for Helicobacter pylori
    - PAS for Fungus
    - Gridley Fungus Stain
- **Written Test** - Nucleic Acid and Polychromatic Stains
- **Practical Test** - Nucleic Acid and Polychromatic Stains

Week 5

- **Lecture**
  - Microscope Session - Microorganism Stains
  - Case Study – Infectious diseases and microorganisms
  - Semester Project Discussion
- **Lab**
  - Microorganism Stains
    - Grocott Methenamine-Silver Nitrate Fungus Stain
    - Warthin-Starry Technique for Spirochetes
    - Dieterle Method for Spirochetes and Legionella Organisms
    - Steiner and Steiner Procedure for Spirochetes, Helicobacter and Legionella Organisms
- **Written & Practical Test** - Microorganism Stains

Week 6

- **Lecture**
  - Pigments, Minerals and Cytoplasmic Granules
  - Microscope Session - Pigments, Minerals and Cytoplasmic Granules
  - Semester Project Idea Due
- **Lab** - Pigments, Minerals and Cytoplasmic Granule Stains
  - Prussian Blue Stain for Ferric Iron
  - Turnbull Blue Stain for Ferrous Iron
  - Schmorl Technique for Reducing Substances
  - Fontana Masson Stain for Melanin and Argentaffin Granules
  - Grimelius Argyrophil Stain
  - Gomori Methenamine-Silver Method for Urates
  - Von Kossa Calcium Stain
  - Rhodanine Method for Copper
- **Written Test** - Pigments, Minerals and Cytoplasmic Granules
- **Semester Project – Idea Due**

Week 7

- **Lectures**
  - Pathologic Changes in Muscle Histology and Properties and Preservation of Enzymes
  - Case Study – minerals, pigments and their identification
  - Professional Development
- **Lab**
  - Enzyme Histochemistry in Muscle Biopsies *observation at NCH.*
- **Semester Project Development**
- **Written Test** - Enzyme Histochemistry in Muscle Biopsies
- **Practical Test** - Pigments, Minerals and Cytoplasmic Granules

Week 8

- **Lecture**
  - Electron Microscopy Fixation and Processing
  - Electron Microscopy Sectioning and Staining
  - Cytopreparation Do's and Don'ts
  - Case Study - electron microscopy and it's utility
  - Case Study: cytology
  - Microscope Session - Cytology
- **Lab**
  - Electron Microscopy *observation in renal pathology*
  - Cytopreparatory Techniques
- **Semester Project Development**
- **Written Test** - Electron Microscopy
- **Practical Test** - Cytology Specimen Preparation

Week 9

- **Lecture**
  - General Immunology
  - Methods of Visualization and Staining Methods
  - Controls and Their Selection
  - Commonly Used Antibodies and Their Applications: Intermediate Filaments and
  - Commonly Used Antibodies and Their Applications: Hematopoietic Markers
  - Case Study – Cases depending on IHC for the diagnosis
- **Lab**
  - Immunohistochemistry observation
  - Immunofluorescence Staining
- **Semester Project Development**
- **Written Test** - Immunology and IHC

Week 10

Spring Break, No Classes

Week 11

- **Lecture**
  - Microscope Session - Immunohistochemistry slides
  - Commonly Used Antibodies and Their Applications: Melanocytic Markers
  - Commonly Used Antibodies and Their Applications: Tumor Markers
  - Commonly Used Antibodies and Their Applications: Neuroendocrine Markers
  - Predictive Markers
  - Immunohistochemistry slides
  - Case Study – IHC used in clinical decision making, such as drug therapies
- **Semester Project Development**
- **Lab**
  - Immunohistochemistry Staining
- **Written Test** - Melanocytic, Tumor and Predictive, Hematopoietic, and Neuroendocrine Markers

Week 12

- **Lecture**
  - Automation and Standardization in Immunohistochemistry
- **Lab**
  - Automation in Immunohistochemistry
- **Semester Project Development**
- **Practical Test** - Immunohistochemistry

Week 13

- **Lecture**
  - In-Situ Hybridization Techniques
  - Molecular Pathology
- **Lab** - In-Situ Hybridization
- **Semester Project Development**
- **Written Test** - In-Situ Hybridization and Molecular Pathology

Week 14

- **Lecture**
  - Compliance in the Laboratory
- **Lab**
  - Performing new testing validation studies, lot-to-lot validations, and quality control selection and documentation
- **Semester Project Development**
- **Written Test** - Quality and Compliance

Week 15

Finalize Semester project

Week 16

- **Written Semester Exam**
- **Practical Semester Exam**
- **Semester Project Due**

Appendix G
Pathology Histotechnologist Certificate Program
Business Plan

Inflation Rate	1.02								
Endowment Distribution	4.25%								
	Year 1	**Year 2**	**Year 3**	**Year 4**	**Year 5**				
Number of Students	2	2	4	4	6				
% Tuition To Pathology	0%	0%	0%	0%	0%				
% Histotech School Endowment	100%	50%	50%	50%	50%				
REVENUE	**Per Student**	**Principle Amount**	**Total Annual Expense**	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**	**Total Years 1 - 5**
Tuition	$4,584.00			$ -	$ -	$ -	$ -	$ -	$ -
Books & Supplies	$750.00			$ 1,500.00	$ 1,500.00	$ 3,000.00	$ 3,000.00	$ 4,500.00	$ 13,500.00
Endowment		$2,500,000		$ 106,250.00	$ 53,125.00	$ 53,125.00	$ 53,125.00	$ 53,125.00	$ 318,750.00
Total Revenue				$ 107,750.00	$ 54,625.00	$ 56,125.00	$ 56,125.00	$ 57,625.00	$ 332,250.00
EXPENSES									
Personnel	**% Effort**		**Total**						
Bonnie	5.00%		$ 7,504.00	$ 7,504.00	$ 7,654.08	$ 7,807.16	$ 7,963.30	$ 8,122.57	$ 39,051.12
Kathy	5.00%		$ 5,305.40	$ 5,305.40	$ 5,411.51	$ 5,519.74	$ 5,630.14	$ 5,742.74	$ 27,609.53
Whitney	0.00%		$ -	$ -	$ -	$ -	$ -	$ -	$ -
Tania	20.00%		$ 35,249.25	$ 35,249.25	$ 35,954.24	$ 36,673.32	$ 37,406.79	$ 38,154.92	$ 183,438.51
Total Salary & Benefits				$ 48,058.65	$ 49,019.83	$ 50,000.22	$ 51,000.23	$ 52,020.23	$ 250,099.16
Supplies	**Cost Per Unit**	**Total # of Units Needed**	**Total**						
Disposable Lab Coats	$ 51.00	1	$ 51.00	$ 51.00	$ 52.02	$ 53.06	$ 54.12	$ 55.20	$ 265.41
Gloves	$ 165.00	1	$ 165.00	$ 165.00	$ 168.30	$ 171.67	$ 175.10	$ 178.60	$ 858.67
Microtome Blades	$ 150.00	1	$ 150.00	$ 150.00	$ 153.00	$ 156.06	$ 159.18	$ 162.36	$ 780.61
Cryotome Blades	$ 150.00	1	$ 150.00	$ 150.00	$ 153.00	$ 156.06	$ 159.18	$ 162.36	$ 780.61
Slides	$ 435.00	1	$ 435.00	$ 435.00	$ 443.70	$ 452.57	$ 461.63	$ 470.86	$ 2,263.76
Xylene	$ 32.00	1	$ 32.00	$ 32.00	$ 32.64	$ 33.29	$ 33.96	$ 34.64	$ 166.53
Ethanol	$ 97.00	1	$ 97.00	$ 97.00	$ 98.94	$ 100.92	$ 102.94	$ 105.00	$ 504.79
Hematoxylin	$ 314.00	1	$ 314.00	$ 314.00	$ 320.28	$ 326.69	$ 333.22	$ 339.88	$ 1,634.07
Eosin	$ 118.00	1	$ 118.00	$ 118.00	$ 120.36	$ 122.77	$ 125.22	$ 127.73	$ 614.08
Hydrogen Peroxide	$ 150.00	1	$ 150.00	$ 150.00	$ 153.00	$ 156.06	$ 159.18	$ 162.36	$ 780.61
Antigen Retrieval Solution	$ 78.00	1	$ 78.00	$ 78.00	$ 79.56	$ 81.15	$ 82.77	$ 84.43	$ 405.92
ABC	$ 190.00	1	$ 190.00	$ 190.00	$ 193.80	$ 197.68	$ 201.63	$ 205.66	$ 988.77
DAB	$ 56.00	1	$ 56.00	$ 56.00	$ 57.12	$ 58.26	$ 59.43	$ 60.62	$ 291.43
CoverSlips	$ 162.00	1	$ 162.00	$ 162.00	$ 165.24	$ 168.54	$ 171.92	$ 175.35	$ 843.05
Normal Serum	$ 105.00	1	$ 105.00	$ 105.00	$ 107.10	$ 109.24	$ 111.43	$ 113.66	$ 546.42
Primary Antibody	$ 300.00	1	$ 300.00	$ 300.00	$ 306.00	$ 312.12	$ 318.36	$ 324.73	$ 1,561.21
Secondary Antibody	$ 175.00	1	$ 175.00	$ 175.00	$ 178.50	$ 182.07	$ 185.71	$ 189.43	$ 910.71
Special Stains	$ 300.00	1	$ 300.00	$ 300.00	$ 306.00	$ 312.12	$ 318.36	$ 324.73	$ 1,561.21
Total Supplies				$ 3,028.00	$ 3,088.56	$ 3,150.33	$ 3,213.34	$ 3,277.60	$ 15,757.83
Service Contracts	**Cost Per Unit**		**Total**						
Processor Annual Contract	$ 200.00		$ 200.00	$ 200.00	$ 200.00	$ 200.00	$ 200.00	$ 200.00	$ 1,000.00
Embedding Station Annual Contract	$ 200.00		$ 200.00	$ 200.00	$ 200.00	$ 200.00	$ 200.00	$ 200.00	$ 1,000.00
Microtome Annual Contract	$ 150.00		$ 150.00	$ 150.00	$ 150.00	$ 150.00	$ 150.00	$ 150.00	$ 750.00
Cryostat Annual Contrat	$ 200.00		$ 200.00	$ 200.00	$ 200.00	$ 200.00	$ 200.00	$ 200.00	$ 1,000.00
Autostainer Annual Contract	$ 200.00		$ 200.00	$ 200.00	$ 200.00	$ 200.00	$ 200.00	$ 200.00	$ 1,000.00
Total Service Contracts				$ 950.00	$ 950.00	$ 950.00	$ 950.00	$ 950.00	$ 4,750.00
Total Expenses				$ 52,036.65	$ 53,058.39	$ 54,100.55	$ 55,163.56	$ 56,247.84	$ 270,606.99
Total Net Gain/Loss				$ 55,713.35	$ 1,566.61	$ 2,024.45	$ 961.44	$ 1,377.16	$ 61,643.01

THE OHIO STATE UNIVERSITY

School of Health and Rehabilitation Sciences
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https://hrs.osu.edu/

May 18, 2017

RE: Histotechnologist Certificate Program

I have the opportunity to evaluate the course and supporting materials for the proposed histotechnologist certificate program. The School of Health and Rehabilitation Sciences and the Division of Medical Laboratory Sciences (MLS) concur with this proposal. We do not offer this coursework in our MLS division and it may be advantageous to our students to have this available for them. We have offered to assist with future accreditation of this certificate program.

Sincerely,

Marcia Nahikian-Nelms, PhD, RDN, LD, CNSC, FAND
Clinical Professor, Health and Rehabilitation Sciences
Director, Academic Affairs
School of Health and Rehabilitation Sciences

THE OHIO STATE UNIVERSITY
WEXNER MEDICAL CENTER

Wendy L. Frankel, MD.
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Chair and Distinguished Professor
Kurtz Chair in Pathology
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614-292-8472 Phone
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May 5, 2017

Cynthia Ledford, MD
Assistant Dean for Curriculum Design and Innovation
College of Medicine Education Leadership Team

RE: New Certificate of Study in Histotechnology

Dear Dr. Ledford,

I am writing to confirm the Department of Pathology has approved the formation of a new Certificate of Study in Histotechnology which would be housed within the department. I send this proposal to the College of Medicine Education Leadership Team with enthusiasm.

Sincerely,

Wendy L. Frankel, M.D.
Kurtz Chair and Distinguished Professor
Chair, Department of Pathology