

HON 300A/350S: The Art and Science of Cell Death

Dr. Susan Walsh
Associate Professor of Biology
Rollins College

Contact Information: Biology Department
Office: Bush 273
Phone: 407.646.2534
Email: sjwalsh@rollins.edu
Office Hours: 11am-1pm Wed. and 2-3pm Thurs.
and by appointment

Prof. Joshua Almond
Associate Professor of Art
Rollins College

Contact Information: Department of Art and Art History
Office: CFAC 101
Phone: 407.646.2500
Email: jalmond@rollins.edu
Office Hours: 11am-12pm Mon thru Thurs
and by appointment

Course Description

This interdisciplinary, laboratory- and studio-based course will enable you to understand and analyze a specific cellular pathway involved in normal programmed cell death in human cells. In groups, you will then apply this knowledge to the development, generation, and testing of your own novel indicator of cell death. Concurrently, you will explore the idea and symbolism of death as it is represented in the visual arts through the creation of sculptural form. Inspired by your scientific investigations, you will design on paper and then in Form Z, our Computer Aided Design (CAD) program, unique sculptures to be fabricated using digital manufacturing tools - 3D printers and Computer Numeric Milling (CNC) machines. Since this course is fully integrated, you must be simultaneously enrolled in both HON300A and HON350S (CRNs 90748 and 90747) in order to receive the full eight credits.

Learning Objectives

Upon completion of the course, you will be able to do the following:

- Demonstrate proficiency of a CAD program (Form Z) and CAM processes (3D printing and CNC milling).
- Translate two-dimensional ideas into three-dimensional constructs.
- Develop design and ideation skills through the prototyping and critical evaluation of potential design solutions.
- Manage production workflow from ideation through digital design and final fabrication.
- Describe the mitochondrial-dependent intrinsic pathway of apoptosis.
- Demonstrate a basic understanding of how proteins are engineered and synthesized.
- Practice basic tissue culture techniques, including pipetting, sterile technique, and transfection.
- Capture fluorescent microscopy images of triple-labeled human tissue culture cells.
- Design, create, and test a genetically engineered fluorescent protein marker of apoptosis.
- Communicate both design and scientific process through written and oral presentations.

Evaluation

ART		SCIENCE	
Form Z Technical Exercises	10%	Exams (3 at 10% each)	30%
Project 1:		Lab Notebook Quizzes	8%
Part 1: Exquisite Corpse	6%	Lab Notebook	5%
Part 2: Form Z Design	10%	Experiment #1: Complete Figure	5%
Part 3: CNC Form	10%	Experiment #2:	
Project 2:		Paragraph Proposal	5%
Part 1: Drawings	7%	Peer Review	2%
Part 2: Form Z Design	14%	Full Proposal	5%
Part 3: 3D Print	14%	Final Paper	22%
3D Printer Practicum	2%	Final Poster/Presentation	10%
CNC Practicum	2%	Partner Evaluations	3%
Quizzes	5%	Class Participation/Homework	5%
Artist Presentation	5%		
Final Poster/Presentation	10%		
Class Participation/Homework	5%		
TOTAL	100%	TOTAL	100%

Believing that our high expectations reflect our respect for you and for your capacity to work at a level of excellence, we will follow the grading standards outlined in the college catalog:

- Grade A is reserved for work that is exceptional in quality and shows keen insight, understanding, and initiative.
- Grade B is given for work that is consistently superior; shows interest, effort, or originality.
- Grade C is a respectable grade. It reflects consistent daily preparation and satisfactory completion of all work required.
- Grade D- is the lowest passing grade. It is below the average necessary to meet graduation requirements and is not accepted for transfer by other institutions.
- Grade F is failing.

Assessment

Exams will be content-based on reading, lecture material, and in-class discussion. They will consist of multiple-choice, short answer, and experimental design questions. Students will be required to maintain a laboratory notebook using the guidelines and format posted on Blackboard. Experimental details are essential to good science, and proper note-taking will be assessed by both laboratory notebook quizzes and notebook collection. The first experiment in the course will be used to model your own original experiment. The Writing Guidelines should be used to provide insight into proper formatting and content for the figures and final paper. For the laboratory work, you will be working with others, and collaboration is required. At the end of each experiment, you will assess your partner's contributions, and this confidential score will be factored into the final grade.

Students will also be expected to complete a series of Form Z tutorial exercises (some independently, some as collaborative groups), develop and present concept drawings, design sculptural forms in the CAD program, and then fabricate them on CAM machinery (3D printer and CNC machines). All these materials will be compiled into a final poster presentation due at the end of the semester. Additionally, students will be expected to research and present on an

assigned contemporary visual artist. Quizzes will be based on course material, slide lectures, and in-class discussions. Practicums will be used to assess student's familiarity with the fabrication tools and process. Class participation is required through discussion and completion of in-class activities; it is expected that you will read materials, including lab handouts, before class. Homework assignments will also reinforce material.

Late Submission Policy

Unless otherwise noted, all work must be turned in for grading at the start of class on the day it is due. Absence in class does not excuse you from submitting assignments. **Late assignments will not be accepted, and a grade of zero will be recorded.**

Required Text and Supplies

The bookstore has *Essential Cell Biology*, 4th edition by Alberts et al, 2014 available for rent or purchase. You are also required to have the following supplies: lab coat, safety goggles with side protection, and a composition book as a lab notebook. More explicit details about notebook organization are included in a separate file on Blackboard. It is also strongly recommended that you secure a flash drive for this course as you will need it for moving image files from the microscope and for storing Form Z renderings.

Course Website

To decrease costs and our impact on the environment, this class will make extensive use of Blackboard (Bb). Bb will be your source for class announcements, laboratory assignments, homework assignments, submitting assignments and papers, lecture notes, grade information, and review materials. Please log into Bb as soon as possible to make sure you have access to all materials.

Laboratory Safety Information

All students are required to wear a laboratory coat (long sleeve and extends to at least mid-thigh) and safety goggles (with side protection) when in the laboratory. You are also required to wear closed-toed shoes and have long hair pulled back at all times when in the laboratory. No food or drink is allowed in the laboratory. State law requires you to be familiar with the laboratory safety regulations established by Rollins College. Questions about these regulations will be answered during the first laboratory session.

You must complete the online safety form by the end of the first week of classes, or you will not be allowed to stay in the course. The online form can be completed on Foxlink, and instructions can be found in the course documents section of Blackboard. The lab safety contract is a legal contract that permits your use of the laboratory. Violation of this contract (e.g. by not wearing closed-toe shoes, goggles, or lab coats; by eating or drinking in lab; etc) without explicit permission from the instructor will result in a **2% deduction of your final grade for each violation after the first warning**. At the end of every lab period you must clean up after yourself. All equipment must be put away, and your professor should be notified if materials are running low. **Failure to clean up after yourself will result in a 1% reduction of your final grade for each offense.**

Shop Hours and Dress Code

At some point during the semester, we will transition from design to fabrication, shifting from the computer lab to the sculpture studio where the CNC machine is housed. The CNC machine is only accessible during class time or by appointment, and no one is permitted to use the machine without Professor Almond's direct supervision.

The sculpture studio is also a laboratory space and should be treated as such. It is an inherently dangerous space with tools and equipment that carry with them a certain amount of personal risk. **Accordingly, you are not permitted to use any tool that you have not been specifically trained on and authorized to use by Professor Almond.** To minimize the danger to you and your classmates, you will also be expected to dress appropriately whenever you are in the studio. **Whenever you are in the studio, you MUST wear closed-toed shoes. Absolutely NO sandals, flip-flops, Tom's, loafers, flats, slippers or other open-toed or soft-sided shoes.** It is recommended that you also wear long pants (preferably denim), and shirts with a modest neckline. Always wear natural fiber clothing whenever possible (no polyester/rayon blends as they are highly flammable). In addition, every time you work with any machinery, you are expected to wear all proper safety equipment, (ie: safety glasses, face shield, hearing protection, dust mask, etc.), and follow all safety procedures.

The studio is a small space, and there will be many students working in there at the same time. Students are encouraged to be respectful and patient with one another and to foster an atmosphere of mutual support. You are expected to take 10-15 minutes before departing to put away your materials, store your projects, clean the floor and table(s) around your work area, and return tools to their proper location. No one is exempt from this responsibility. **Failure to clean up after yourself will result in a 1% reduction of your final grade for each offense.**

Attendance Policy

Your attendance of every class session is essential. Attendance means not only arriving to class on time, but also being prepared by already having read the day's materials and participating actively in discussions. We begin at 8 a.m. sharp, and you will be considered absent after we have begun class.

You are allowed a total of **three (3)** absences which includes all class sessions and any/all external appointments, practicums, and lab components. Each absence over the specified limit will result in the final grade being dropped an additional 3%. **Six or more class absences will result in automatically failing the course.** You should save your absences for dire emergencies or serious illnesses. Meetings, job interviews, or early departures for weekend trips are not excused and will count as absences.

Excused absences are defined as

- Representing Rollins College formally on an athletic team or an approved academic forum.
- Extreme health emergency that requires hospitalization or medical intervention. A cold that results in a doctor's visit does not constitute an "extreme health emergency." In the case of a medical emergency, the student must provide written medical documentation.
- Extreme family emergency. For example, a death in the immediate family. Roommate problems, legal proceedings, arrests, are NOT considered "family emergencies."
 - A parent or legal guardian must document any family emergency.
- The student must notify the professor of any emergency in a timely fashion (by e-mail, phone, or in person). If notification is sent by e-mail, the professor will respond acknowledging the message. If no response is given, the e-mail is considered not received. Once the professor has been notified, all written documentation must be submitted in person within one week of the absence.
- The professor is the final arbiter of whether or not to consider an absence "excused" based on the circumstances and documentation on a case by case basis.
- Traveling home early for holidays **IS NOT** an excused absence.

The professor will accommodate a reasonable number of excused absences for religious holidays and official off-campus college business such as academic conference presentations and athletic competitions. However, per the College's policy on excused absences (http://www.rollins.edu/catalogue/academic_regulations.html#class-attendance) students must discuss with the professor the dates of the anticipated absences no later than the last day of the drop period. Students must present to their professor written evidence of the anticipated absences and discuss with him/her how and when make-up work should be completed prior to missing the class. Students should not expect to receive allowance for excused absences if they do not meet with the professor beforehand and clarify the dates as necessary. Absences will be addressed by the faculty member in accordance with his/her attendance policy. The professor retains the right to determine what would be considered to be a reasonable number of absences (excused or otherwise) for the course. A student will not fail a course because the number of religious observances and/or college business absences exceed the number of absences allowed, except if excessive absences make it impossible to fulfill the expectations of the course. The student's class participation grade in the course, though, may still be affected.

Academic Honor Code Reaffirmation (updated 7/18/18)

<http://www.rollins.edu/honor-code/documents/academic-honor-code-rollinscollege.pdf>

Membership in the student body of Rollins College carries with it an obligation, and requires a commitment, to act with honor in all things. The student commitment to uphold the values of honor - honesty, trust, respect, fairness, and responsibility - particularly manifests itself in two public aspects of student life. First, as part of the admission process to the College, students agree to commit themselves to the Honor Code. Then, as part of the matriculation process during Orientation, students sign a more detailed pledge to uphold the Honor Code and to conduct themselves honorably in all their activities, both academic and social, as a Rollins student. A student signature on the following pledge is a binding commitment by the student that lasts for his or her entire tenure at Rollins College. The development of the virtues of Honor and Integrity are integral to a Rollins College education and to membership in the Rollins College community. Therefore, I, a student of Rollins College, pledge to show my commitment to these virtues by abstaining from any lying, cheating, or plagiarism in my academic endeavors and by behaving responsibly, respectfully and honorably in my social life and in my relationships with others. This pledge is reinforced every time a student submits work for academic credit as his/her own.

Students shall add to the paper, quiz, test, lab report, etc., the handwritten signed statement: **"On my honor, I have not given, nor received, nor witnessed any unauthorized assistance on this work."** Material submitted electronically should contain the pledge; submission implies signing the pledge.

Citation Expectations

As per the Academic Honor Code, plagiarism is defined as "Offering the words, facts, or ideas of another person as your own in any academic exercise." In order to avoid plagiarism, all students are expected to use proper citation norms. For our course, all assignments will use the citation style in the Writing Style Guidelines on Bb.

Credit Hour Statement for Rollins Courses

This course is a four-credit-hour course that meets three hours per week. The value of four credit hours results, in part, from work expected of enrolled students both inside and outside the classroom. Rollins faculty require that students average at least 2 ½ hours of outside work for every hour of scheduled class time. In this course, the additional outside-of-class expectations

include a significant investment in your studio and laboratory projects, literature research, reading assignments, writing papers, presentation preparation, and collaboration with your peers.

Accessibility Services

Rollins College is committed to equal access and inclusion for all students, faculty and staff. The Rehabilitation Act of 1973 and the Americans with Disabilities Act of 1990 create a foundation of legal obligations to provide an accessible educational environment that does not discriminate against persons with disabilities. It is the spirit of these laws which guides the college toward expanding access in all courses and programs, utilizing innovative instructional design, and identifying and removing barriers whenever possible. If you are a person with a disability and anticipate needing any type of academic accommodations in order to fully participate in your classes, please contact the Office of Accessibility Services, located on the first floor of the Olin Library, as soon as possible. You are encouraged to schedule a Welcome Meeting by filling out the "First Time Users" form on the website: <http://www.rollins.edu/access> and/or reach out by phone or email: 407-975-6463 or Access@Rollins.edu. All test-taking accommodations requested for this course must first be approved through the Office of Accessibility Services (OAS) and scheduled online through Accommodate at least 72 hours before the exam. Official accommodation letters must be received by and discussed with the faculty in advance. There will be no exceptions given unless previously approved by the OAS with documentation of the emergency situation. We highly recommend making all testing accommodations at the beginning of the semester. OAS staff are available to assist with this process.

Recording Device Use

In order to protect the integrity of the classroom experience, the use of recording devices is limited to either the expressed permission of the faculty member or with proper documentation from the Office of Accessibility Services. Information about accommodations through Accessibility Services can be found at <http://www.rollins.edu/accessibility-services/>. Recording without the proper authorization is considered a violation of the Rollins Code of Community Standards.

Title IX Statement (updated 7/18/18)

Rollins College is committed to making its campus a safe place for students. If you tell any of your faculty about sexual misconduct involving members of the campus community, your professors are required to report this information to the Title IX Coordinator. Your faculty member can help connect you with the Title IX Coordinator, (TitleIX@rollins.edu or 407.691.1773). You will be provided with information, resources and support. If you would prefer to speak to someone on campus confidentially, please call the Wellness Center at 407.628.6340. They are not required to report any information you share with the Title IX Coordinator. Misconduct under Title IX includes gender-based discrimination and harassment, sexual harassment, sexual violence including fondling and assault, sexual coercion/force, sexual-based communication, sexual exploitation, interpersonal violence including dating and domestic violence, stalking, complicity and retaliation. Everyone is protected under the following protected statuses: sex (including pregnancy), gender, gender identity (including transgender status), gender expression, and sexual orientation. For information, visit <http://www.Rollins.edu/titleix>

Proposed Course Calendar

		In-Class Activities	Homework/Class Prep
Aug	28	Syllabus and Course Overview Lecture: Cells Lecture: Death in the Visual Arts Lecture: Elements of Design Lab: Introduction to Form Z	ECB: Chapter 1 Launching Chapter 9 Form Z Tutorial Video 1
Aug	30	Quiz: Elements of Design Lecture: Proteins Lecture: Principles of Design Lab: Form Z Exercise 1	Design Pretest ECB: Chapter 4 Launching Chapter 10 Form Z Tutorial Video 2
Sep	4	Exam 1: Cells & Proteins Lab: Experiment 1/ Day 1 Lab: Form Z Exercise 2	Lab Handout 1 Form Z Tutorial Video 3
Sep	5	Set Up Bacterial Cultures 3:00 – 6:00pm	Lab Handout 2 Budget 20min
Sep	6	Lecture: Gene Expression Lab: Experiment 1/ Day 2	ECB: Chapter 7 Form Z Tutorial Video 4
Sep	11	Quiz: Principles of Design Recombinant DNA Lab: Experiment 1/ Day 3 Lab Notebook Quiz 1	Lab Handout 3 ECB: Chapter 10 Watch Splitting Cells Video Form Z Tutorial Video 5
Sep	12	Experiment 1/ Day 4	By Appt. - Budget 30min
Sep	13	Lab: Experiment 1/ Day 5 Lecture: Semiotic Theory Lab: Form Z Exercise 3	Lab Handout 4 Introduction to Semiotic Theory Form Z Tutorial Video 6
Sep	13-17	Experiment 1 / Day 6	By Appt. - Budget 2 Hours
Sep	18	Exam 2: Central Dogma Lab: Form Z Exercise 4	Prep Experiment 1 Figure w/Legend Form Z Tutorial Video 7
Sep	20	Quiz – Semiotic Theory Lecture: Apoptosis Lab Notebook Quiz 2 Lab: Form Z Exercise 5	Bb Reading Form Z Tutorial Video 8
Sep	25	Exam 3: Apoptosis Project 1: Exquisite Corpse	Experiment 1 Figure w/ Legend Due by Start of Class 9/27
Sep	27	Figure 1 w/ Legend Due Converting Design to .stl Project 1: Form Z Design	Tutorial Video - Converting Your File For Print

Oct	2	Quiz – Death in Visual Arts CNC Tutorial Project 1: Form Z Design	Tutorial Video – CNC Operation
Oct	3-11	CNC Lab Practicum	By Appt. - Budget 30min
Oct	4	Project 1: Form Z Design Experiment 2 Design – Paragraph Due by the End of Class	
Oct	9	Project 1: Form Z Design	Bring Full Proposal Smooth Draft to Class 10/11
Oct	11	Project 1: Form Z Design Peer Review of Experiment 2 Full Proposal and Partner Evaluation 1	
Oct	12	Full Proposal Due to Blackboard By 5pm	
Oct	16	Fall Break - No Class - Project 1 Due by 8am (Submit as .fmz and .stl files)	
Oct	18	Begin Project 2: Design Stage	Bring Images of Experiment 1 to Class
Oct 22 – Nov 16		Mill Project 1 on CNC Machine	By Appt. - Milling time will vary based on project.
Oct	23	Project 2 Sketches Due – Critique Begin Form Z Design Process	
Oct	25	Lab: Experiment 2	Lab Handout 5
Oct	30	Lab: Experiment 2 Continue Project 2: Form Z	Lab Handout 6
Oct	31	Set Up Bacterial Cultures 3:00 – 6:00pm	Budget 20min
Nov	1	Lab: Experiment 2 Lecture: Cura and 3D Printing Continue Project 2: Form Z	Lab Handout 7 Cura and 3D Printing Tutorial
Nov	2-13	3D Printing Practicum	By Appt. - Budget 30min
Nov	6	Lab: Experiment 2 Lab Notebook Quiz 3 Continue Project 2: Form Z	Artist Presentations Due by 5pm Nov 7
Nov	8	Lab: Experiment 2 Continue Project 2: Form Z	Objects Due For Test Printing
Nov	13	Artist Presentations (3) Lab: Experiment 2 Continue Project 2: Form Z	Test Print (By Appt.)

Nov	14	Lab: Experiment 2: Transfection	By Appt. - Budget 30 min
Nov	15	Artist Presentations (3) Lab: Experiment 2 Continue Project 2: Form Z	Test Print (By Appt.)
Nov	15-19	Experiment 2: Imaging Cells	By Appt. - Budget 2 Hours
Nov	20	Artist Presentations (3) Continue Project 2: Form Z	Test Print (By Appt.)
Nov	22	Thanksgiving Break - No Class	
Nov	26-30	Repeat Experiment 2 (Split, Transfect, Kill, Fix, Image)	On Your Own Time
Nov	27	Artist Presentations (3) Continue Project 2: Form Z	3D Print Final Forms (By Appt.)
Nov	29	Artist Presentations (3) Continue Project 2: Form Z	3D Print Final Forms (By Appt.)
Dec	4	Artist Presentation Quiz Paper/Poster/Presentation Prep	3D Print Final Forms (By Appt.)
Dec	6	Experiment 2 Paper Due Poster Due by end of class Partner Evaluation 2 Lab Notebook Due by end of class	Experiment 2 Paper Due by Start of Class
Dec	13	Poster/Object Presentation	