

# FLORIDA ATLANTIC UNIVERSITY™

## Graduate Programs—NEW COURSE PROPOSAL<sup>1</sup>

UGPC APPROVAL \_\_\_\_\_  
 UFS APPROVAL \_\_\_\_\_  
 SCNS SUBMITTAL \_\_\_\_\_  
 CONFIRMED \_\_\_\_\_  
 BANNER POSTED \_\_\_\_\_  
 CATALOG \_\_\_\_\_

DEPARTMENT **BIOLOGICAL SCIENCES**

COLLEGE **CESCOS**

RECOMMENDED COURSE IDENTIFICATION (TO OBTAIN A COURSE NUMBER, CONTACT [NMALDONADO@FAU.EDU](mailto:NMALDONADO@FAU.EDU))

PREFIX **BSC** \_\_\_\_\_ COURSE NUMBER **6466** \_\_\_\_\_ LAB CODE (L or C) \_\_\_\_\_

COMPLETE COURSE TITLE: **COMPUTER GRAPHICS FOR BIOLOGISTS**

### EFFECTIVE DATE

(first term course will be offered)

FALL 2016

CREDITS<sup>2</sup>

3

TEXTBOOK INFORMATION

No text required

GRADING (SELECT ONLY ONE GRADING OPTION): REGULAR \_\_\_\_\_ SATISFACTORY/UNSATISFACTORY \_\_\_\_\_

#### COURSE DESCRIPTION, NO MORE THAN THREE LINES:

This hands-on course will introduce students to how computer graphics are used in biological sciences for illustration, data extraction, and presentation. Each class will integrate formal lecture sessions with hands-on application at a computer.

#### PREREQUISITES\*

Graduate level or permission of instructor.

#### COREQUISITES\*

None

#### REGISTRATION CONTROLS (MAJOR, COLLEGE, LEVEL)\*

Graduate

\* PREREQUISITES, COREQUISITES AND REGISTRATION CONTROLS WILL BE ENFORCED FOR ALL COURSE SECTIONS.

**MINIMUM QUALIFICATIONS NEEDED TO TEACH THIS COURSE:** FAMILIARITY WITH THE SCIENTIFIC LITERATURE, EXPERIENCE PUBLISHING IN SCIENTIFIC JOURNALS, FAMILIARITY WITH SCIENTIFIC ETHICS, FAMILIARITY WITH CONFERENCE PRESENTATIONS (ORAL AND POSTER), EXPERIENCE WITH SCIENTIFIC IMAGING, FAMILIARITY WITH RELEVANT SOFTWARE.

**MEMBER OF THE GRADUATE FACULTY OF FAU AND HAS A TERMINAL DEGREE IN THE SUBJECT AREA (OR A CLOSELY RELATED FIELD).**

Faculty contact, email and complete phone number:

Stephen Kajiura  
 kajiura@fau.edu  
 561-297-2677

Please consult and list departments that might be affected by the new course and attach comments.<sup>3</sup>

#### Approved by:

Department Chair: \_\_\_\_\_

College Curriculum Chair: \_\_\_\_\_

College Dean: \_\_\_\_\_

UGPC Chair: \_\_\_\_\_

Graduate College Dean: \_\_\_\_\_

UFS President: \_\_\_\_\_

Provost: \_\_\_\_\_

#### Date:

02.09.16

2-19-16

2-19-16

3-2-16

3-2-16


1. Syllabus must be attached; see guidelines for requirements: [www.fau.edu/provost/files/course\\_syllabus.2011.pdf](http://www.fau.edu/provost/files/course_syllabus.2011.pdf)

2. Review Provost Memorandum: **Definition of a Credit Hour** [www.fau.edu/provost/files/Definition\\_Credit\\_Hour\\_Memo\\_2012.pdf](http://www.fau.edu/provost/files/Definition_Credit_Hour_Memo_2012.pdf)

3. Consent from affected departments (attach if necessary)



Charles E. Schmidt College of Science  
Department of Biological Sciences  
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**TO:** University Graduate Programs Committee (UGPC)  
**FROM:** Rodney Murphey, Ph.D.   
Professor and Chair  
Department of Biological Sciences  
**DATE:** February 8th, 2016  
**RE:** New Course Proposal Consent

To Whom It May Concern:

This note constitutes acknowledgement and consent of the Department of Biological Sciences for the creation of a new course within the department: **BSC 6466: Computer Graphics for Biologists.**

Best Regards,

Rodney Murphey, Ph.D.  
Chairman, Department of Biological Sciences  
Director, Life Science Initiative on the MacArthur Campus

## Computer graphics for biologists

**Course:** BSC 6466 (3 credits)

**Semester:** Fall 2016

**Instructor:** Dr. Stephen Kajiura

**Email:** kajiura@fau.edu

**Office:** Sanson 215; hours: Tue 1:30- 4:30pm

**Phone:** 561-297-2677

### Course schedule:

Tue 6:00 - 9:00 pm

Sanson 118

Aug 23- Nov 29 2016

See attached schedule for details

### Prerequisites:

Graduate level or permission of instructor.

### Course description:

This hands-on course will introduce students to how computer graphics are used in biological sciences for illustration, data extraction, and presentation. Each class will integrate formal lecture sessions with hands-on application at a computer.

### Course objectives:

By the end of this course, students will have been exposed to the fundamentals of computer graphics and their application in scientific communication. Students will be able to distinguish between raster and vector graphics and choose the appropriate format for the project. They will have an understanding of how to acquire quality scientific images for illustrative and data extraction purposes. They will be exposed to image enhancement techniques and be familiar with the scientific ethics of photo manipulation. They will be exposed to scientific illustration using vector graphics, including 3D modeling. They will also be instructed on how to create effective scientific presentations, both oral and posters. They will be able to critically evaluate posters and presentation graphics and create their own materials to a high professional standard.

### Content:

This course will integrate lectures on the fundamentals of computer graphics with practical experience working with the software. Enrollment is limited to the number of computers available. Students will be exposed to the following software: Photoshop, ImageJ, Illustrator, Sketchup, and Powerpoint. Familiarity with these programs is not required, although it is beneficial.

The course will introduce students to raster graphics and how they can be manipulated to facilitate data extraction. Considerable time will be spent on how to capture biologically meaningful photographs since the quality of the data is dependent upon the quality of the image. Students will be taught the basics of digital image enhancement using Photoshop and informed about the scientific ethics of photo manipulation. Students will then be taught how to utilize the image analysis software ImageJ to extract data from the photographs. The second half of the course will examine how vector graphics are used for illustration. Students will be taught the

basics of vector illustration using the software Illustrator and be exposed to 3D modeling using Sketchup. Students will learn how to prepare figures for publication according to scientific journal standards. They will learn best practices for preparing a poster and a media-rich Powerpoint talk.

Students will be graded on their weekly homework assignments, projects, final presentation, their critique of other presentations and their participation in class discussions.

**Weekly homework assignments and projects:**

Each student will be assigned to present to the class a brief summary of an applicable software tool from the software package that we are learning that week. This will enable students to learn their particular tool well enough to be able to teach their peers. It will also provide them with weekly opportunities to practice their presentation skills.

Students will also be given other project assignments throughout the semester. These projects will require the students to demonstrate mastery of the skills that they acquire in each section of the course.

**Final presentation:**

Each student will present a conference-ready Powerpoint talk (12 min) incorporating photographs, vector graphics and a video clip. The other members of the class will critique the technical aspects of the presentation and provide constructive feedback. With permission of the instructor, a student may be able to substitute a conference poster for the talk. The poster will be subjected to the same class critique.

**Critiques:**

As each student presents their weekly homework assignments, projects, and final conference-ready presentation, their classmates will critique the technical aspects of the presentation in light of what they have learned throughout the semester. Each student will prepare a written critique of the presentation for each of their classmates. These written critiques will be evaluated for completeness and will be considered when determining the final grade.

**Participation:**

Part of the final grade is determined by the level of participation exhibited by each student during class discussions and activities.

**Course evaluation:**

Weekly assignments	30
Projects	30
Final presentation	15
Presentation critiques	15
Participation	...u!
Total	100

**Course grading scale:**

A	90-100
B	80-89
C	70-79

D 60-69  
F <60

**Religious accommodation:**

Reasonable accommodation will be made for students participating in a religious observance.

**Students with disabilities:**

*In compliance with the Americans with Disabilities Act (ADA), students who require reasonable accommodations due to a disability to properly execute coursework must register with the Office of Student Accessibility Services (SAS) and follow all SAS procedures. SAS has offices across three of FAU's campuses- Boca Raton, Davie, and Jupiter, however, disability services are available for students on all campuses.*

**Honor code:**

Students at Florida Atlantic University are expected to maintain the highest ethical standards. Academic dishonesty, including cheating and plagiarism, is considered a serious breach of these ethical standards, because it interferes with the University mission to provide a high quality education in which no student enjoys an unfair advantage over any other. Academic dishonesty is also destructive of the University community, which is grounded in a system of mutual trust and places high value on personal integrity and individual responsibility. Harsh penalties are associated with academic dishonesty. For more information, see [http://www.fau.edu/ctl/4.001\\_Code\\_of\\_Academic\\_Integrity.pdf](http://www.fau.edu/ctl/4.001_Code_of_Academic_Integrity.pdf)

**Suggested texts:**

The material that we will cover will be largely available free online through various websites such as:

<http://imagej.nih.gov/ij/docs/examples/>  
<http://tv.adobe.com/show/learn-photoshop-cs6/>  
<http://tv.adobe.com/show/learn-illustrator-cs6/>  
<http://www.sketchup.com/learn>

The following texts are not required, but may be useful for reference:

Photoshop CS6: Visual QuickStart Guide, ISBN-13: 978-0321822185

Illustrator CS6: Visual QuickStart Guide, ISBN-13: 978-0321822178

Both are available as physical copies or via electronic download.

*Tentative schedule – the instructor reserves the right to reassign the order of the lectures.*

<b>Date</b>	<b>Topic</b>
23-Aug	Overview and introduction to raster graphics
30-Aug	Scientific photography – exposure, composition
06-Sep	Scientific photography – macro, resolution
13-Sep	Image enhancement – Photoshop basics
20-Sep	Image enhancement – Photoshop intermediate
27-Sep	Data extraction – ImageJ basics
04-Oct	Data extraction-ImageJ intermediate
11-Oct	Introduction to vector graphics – Illustrator basics
18-Oct	Vector graphics – Illustrator intermediate
25-Oct	3D modeling- Sketchup basics
01-Nov	3D modeling - Sketchup intermediate
08-Nov	Scanning, printing, and output for journal publication
15-Nov	Effective presentations – posters
22-Nov	Effective presentations – Powerpoint
29-Nov	Student presentations

*Weekly Assignments*

<b>Date</b>	<b>Topic</b>
23-Aug	View Composition, Exposure, ISO, Lighting
30-Aug	View Lenses, Focal Length, Macro
06-Sep	View Histogram, Studio
13-Sep	Create SOP for assigned Photoshop tool; View Photoshop Workspace, Viewing & Zooming Images, Cropping & Transforming
20-Sep	Create SOP for assigned Photoshop tool; View Layers, Image Adjustment, Selecting Parts of an Image
27-Sep	Create SOP for assigned ImageJ tool; View ImageJ Basics, Image Processing with ImageJ, Area Measurements and Particle Counting, Automated Segmentation and Morphometry
04-Oct	Create SOP for assigned ImageJ tool; View Analyzing fluorescence microscopy images with ImageJ, Batch Processing in ImageJ, Dot Blot Analysis, Optical Density Calibration, Quantifying Stained Liver Tissue
11-Oct	Create SOP for assigned Illustrator tool; View Getting Started with Illustrator CS6
18-Oct	Create SOP for assigned Illustrator tool;

## View Figures & Illustrations

25-Oct	Create SOP for assigned Sketchup tool; View Getting Stalted, Toolbar Series
01-Nov	Create SOP for assigned Sketchup tool; View Layout, Beyond Sketchup
08-Nov	View Sharing & Printing Photos
15-Nov	Create poster outline
22-Nov	Create powerpoint outline
29-Nov	Student presentations