



OPTI 596: Computational Photography

Spring 2024

Wyant College of Optical Sciences

Course Instructor: David J. Brady

Location: Meinel 307 and online

Email: djbrady@arizona.edu (<mailto:djbrady@arizona.edu>) (Please Note: Include "Course Prefix and Number" in the subject line of emails)

Course Description

Computational photography blends computer algorithms with traditional photography to create images that are not feasible with traditional digital imaging. This course examines the data structure of computational images and considers design and implementation of optimized sampling, estimation and control strategies. We consider array camera systems and multidimensional estimation strategies.

Course Outcomes

Upon successful completion of this course, students should be able to:

1. estimate images from raw data using conventional and neural estimators
2. describe optimal focus and exposure control strategies
3. describe color and polarization content images
4. describe the light field and light field sampling strategies
5. create panoramic images from array camera data
6. process multiframe video data to improve spatial and temporal resolution

7. model imaging systems in python and create written reports using Jupyter notebooks.

Course Materials

The course will use notes and code notebooks posted online.

Grading

Students will model systems using python in computational imaging exercises. The course grade will be based 70% on homework scores and 30% on the term project. The 6 exercise assignments will be weighted equally. Each assignment will receive a numerical score between 0 and 100.

Grading Scale

A weighted grade of >90% will be grade A, <90% and >80% graded B, <80% and >70% graded C, <70% and >60% graded D.

Late Work Policy

Late work without prior approval will not be accepted.

Policies

Absence and Class Participation Policy

Absences for any sincerely held religious belief, observance, or practice will be accommodated where reasonable: [Religious Accommodation Policy \(http://policy.arizona.edu/human-resources/religious-accommodation-policy\)](http://policy.arizona.edu/human-resources/religious-accommodation-policy).

Absences pre-approved by the UA Dean of Students (or dean's designee) will be honored.

Accessibility and Accommodations

It is the University's goal that learning experiences be as accessible as possible. If you anticipate or experience physical or academic barriers based on disability or pregnancy, please let me know immediately so that we can discuss options. You are also welcome to contact the Disability

Resource Center at their website: [Disability Resource Center \(https://drc.arizona.edu\)](https://drc.arizona.edu). You can also call: 520-621-3268 or email: uadrc@email.arizona.edu to establish reasonable accommodations.

[Confidentiality of Student Records \(https://deanofstudents.arizona.edu/student-assistance/confidentiality-privacy\)](https://deanofstudents.arizona.edu/student-assistance/confidentiality-privacy)

Copyright

Students are advised that all lecture notes, lectures, study guides and other course materials disseminated by the instructor to the students, whether in class or online, are original materials and reflect intellectual property of the instructor or author of those works. All readings, study guides, lecture notes and handouts are intended for individual use by students. Students may not distribute or reproduce these materials for commercial purposes without the express written consent of the instructor. Students who sell or distribute these materials for any use other than their own are in violation of the [University of Arizona's Intellectual Property Policy \(http://policy.arizona.edu/research/intellectual-property-policy\)](http://policy.arizona.edu/research/intellectual-property-policy). Violations of the instructor's copyright may result in course sanctions and violate the Code of Academic Integrity.

Subject to Change Statement

Information contained in the course syllabus, other than the grade policies, may be subject to change with reasonable notice, as deemed appropriate by the instructor. If any changes are made, they will be provided immediately in writing to students via posting to the D2L course website.

Threatening Behavior

The University seeks to promote a safe environment where students and employees may participate in the educational process without compromising their health, safety or welfare. [The Arizona Board of Regents' Student Code of Conduct, ABOR Policy 5-308 \(http://policy.arizona.edu/education-and-student-affairs/threatening-behavior-students\)](http://policy.arizona.edu/education-and-student-affairs/threatening-behavior-students) prohibits threats of physical harm to any member of the University community, including to one's self.

Threatening behavior can harm and disrupt the University, it's community and its families.

Academic Integrity

Students are encouraged to share intellectual views and discuss freely the principles and applications of course materials. However, graded work/exercises must be the product of independent effort unless otherwise instructed (e.g., the collaborative learning experience is, by nature, not an independent assignment). Students are expected to adhere to the [Code of Academic Integrity](#).

(<https://deanofstudents.arizona.edu/policies-and-codes/code-academic-integrity>).

Grade Appeals

If you would like to appeal a grade for an exam or assignment, you should do so within 7 days from the day the grade was returned to you. Any appeal that does not come within 7 days will not be considered. If you make an appeal, you should state either (a) why you believe your exam or assignment was incorrectly scored, or (b) why you believe your answer to a question or item is correct.

Incomplete Grade Policy

Incomplete grades will be given only in special circumstances as outlined in university policy as stated in [The University of Arizona Academic Policies \(https://catalog.arizona.edu/policy/grades-and-grading-system\)](#).

Student Responsibility for Managing their Course Progress

Although I try to help guide you through the course, it is ultimately the responsibility of the student to direct their course progress, including following the course schedule, minding due dates, keeping up with required readings, and participating in all class components. All due dates are listed in the syllabus and on the course calendar. If you find that you are having trouble keeping up with course material, please feel free to sign up for Remind text message reminders (more information about how to sign up will be provided via email and posted to the News board at the beginning of the semester).

Class Courtesy

It is expected that students may disagree with the research presented or the opinions of their fellow classmates. To disagree is fine but to disparage other views is unacceptable. All comments should be kept civil and thoughtful.