

# USC Viterbi School of Engineering

## Course Syllabus

**Course Title:** EE569 Introduction to Digital Image Processing  
**Units:** 4  
**Lecture Time:** 2019 Spring, Monday and Wednesday 8-9:50am  
**Lecture Location:** OHE 122  
**Discussion Time:** Tuesday 5-5:50pm  
**Discussion Location:** OHE 132

**Instructor:** Prof. C.-C. Jay Kuo  
**Office:** Ming Hsieh Dept. of Electrical Engineering, Room EEB 440  
**Office Hours:** Monday and Wednesday: 10-11am  
**Contact Info:** E-mail: [cckuo@sipi.usc.edu](mailto:cckuo@sipi.usc.edu), Tel: (213) 740-4658

**Website:** <https://courses.uscden.net/d2l/login>  
1. Check the website for latest announcements and project assignments.  
2. For general questions, please utilize the discussion board on the website. TAs will check the forum on a daily basis.

**Teaching Assistant:** Yuanhang Su ([suyuanhang@hotmail.com](mailto:suyuanhang@hotmail.com)), Yueru Chen ([yueruche@usc.edu](mailto:yueruche@usc.edu)), Ruiyuan Lin ([ruiyuanl@usc.edu](mailto:ruiyuanl@usc.edu)), Wei Wang ([wang890@usc.edu](mailto:wang890@usc.edu))

**Office Hours:**  
Yuanhang Su: Monday 10-11am, Wednesday 10-11am, Friday 2-3pm  
Yueru Chen: Tuesday 12-3pm  
Wei Wang: Wednesday 4-5pm, Friday 3-5pm  
Ruiyuan Lin: Thursday 2-5pm

**Grader:** Min Zhang ([zhan980@usc.edu](mailto:zhan980@usc.edu)), Yao Zhu ([yaozhu@usc.edu](mailto:yaozhu@usc.edu)), Yingpeng Deng ([yingpend@usc.edu](mailto:yingpend@usc.edu))

Graders' office hours by appointment only. Once grades for each assignment are out, graders will announce their office hours to answer grading related questions.

### Teaching Objectives

To equip students with fundamental knowledge of theory, algorithms and applications of modern digital image processing techniques and the programming skills for their implementation

**Prerequisite/Co-Requisite:** None

**Recommended Preparation:** EE503

### Programming Language Requirement:

Use either C/C++ or Matlab to implement the algorithms in your homework. You are encouraged to use C/C++ since it is commonly used in industry.

**Midterm Exams:**

- 1<sup>st</sup> midterm exam: February 11 (Monday) 8-9:50am
- 2<sup>nd</sup> midterm exam: March 20 (Wednesday) 8-9:50am

**Homework and Term Project:**

There will be six homework assignments. Each home assignment contains two computer programming projects. All homework assignments will be due on the midnight of the due date (11:59pm) - no late homework will be accepted.

Homework and Term Project Schedule

**Assignment #1:** Assigned on January 7 (Monday); Due on January 22 (Tuesday).

**Assignment #2:** Assigned on January 23 (Wednesday); Due on February 12 (Tuesday).

**Assignment #3:** Assigned on February 13 (Wednesday); Due on March 3 (Sunday).

**Assignment #4:** Assigned on March 4 (Monday); Due on March 19 (Tuesday).

**Assignment #5:** Assigned on March 20 (Wednesday); Due on April 7 (Sunday).

**Assignment #6:** Assigned on April 8 (Monday); Due on April 28 (Sunday).

**Grading Policy:**

1. Midterm Exam: 25% (12.5% each)
2. Homework Assignments: 75% (12.5% each)
  - a. Quality of written report (30%)
  - b. Quality of experimental results (60%)
  - c. Quality of codes plus semester-end oral exam (10%)

**Textbook:**

William K. Pratt: Digital Image Processing, 4th Edition, John Wiley & Sons Inc., 2007. (ISBN 9780471767770).

**Coverage:**

Topic #1: Image demosaicing, contrast/histogram manipulation, enhancement and filtering

Topic #2: Image denoising

Topic #3: Edge and boundary detection

Topic #4: Digital halftoning

Topic #5: Geometric image modification and image warping

Topic #6: Morphological processing, shape analysis and retrieval

Topic #7: Texture analysis and segmentation

Topic #8: Salient point detection and image matching

Topic #9: Fundamentals of convolutional neural networks

Topic #10: Feedforward-designed convolutional neural networks

Topic #11: Applications of convolutional neural networks

**Homework Coverage:**

Homework Assignment #1 (Coverage: Topics #1-2)

Homework Assignment #2 (Coverage: Topics #3-4)

Homework Assignment #3 (Coverage: Topics #5-6)

Homework Assignment #4 (Coverage: Topics #7-8)

Homework Assignment #5 (Coverage: Topics #9)  
Homework Assignment #6 (Coverage: Topics #10)

# Statement on Academic Conduct and Support Systems

## Academic Conduct

Plagiarism – presenting someone else’s ideas as your own, either verbatim or recast in your own words – is a serious academic offense with serious consequences. Please familiarize yourself with the discussion of plagiarism in SCampus in Section 11, Behavior Violating University Standards: <https://scampus.usc.edu/1100-behavior-violating-university-standards-and-appropriate-sanctions>. Other forms of academic dishonesty are equally unacceptable. See additional information in SCampus and university policies on scientific misconduct, <http://policy.usc.edu/scientific-misconduct>.

Discrimination, sexual assault, and harassment are not tolerated by the university. You are encouraged to report any incidents to the Office of Equity and Diversity (<http://equity.usc.edu>) or to the Department of Public Safety (<http://adminopsnet.usc.edu/department/department-public-safety>). This is important for the safety of the whole USC community. Another member of the university community – such as a friend, classmate, advisor, or faculty member – can help initiate the report, or can initiate the report on behalf of another person. The Center for Women and Men (<http://www.usc.edu/student-affairs/cwm/>) provides 24/7 confidential support, and the sexual assault resource center webpage (<http://sarc.usc.edu>) describes reporting options and other resources.

## Support Systems

A number of USC’s schools provide support for students who need help with scholarly writing. Check with your advisor or program staff to find out more. Students whose primary language is not English should check with the American Language Institute <http://dornsife.usc.edu/ali>, which sponsors courses and workshops specifically for international graduate students. The Office of Disability Services and Programs ([http://sait.usc.edu/academicsupport/centerprograms/dsp/home\\_index.html](http://sait.usc.edu/academicsupport/centerprograms/dsp/home_index.html)) provides certification for students with disabilities and helps arrange the relevant accommodations. If an officially declared emergency makes travel to campus infeasible, USC Emergency Information (<http://emergency.usc.edu>) will provide safety and other updates, including ways in which instruction will be continued by means of blackboard, teleconferencing, and other technology.