3. 電気電子情報工学系　Electrical, Electronics and Computer Engineering Field		EEC-S5
授業科目名 Course Title	画像処理 Image Processing	単位数 Credit	**2**
担当教員 Instructor	東海 彰吾　TOKAI Shogo 吉田 俊之　YOSHIDA Toshiyuki	開講学期 Semester	春学期 Spring
キーワード Keywords	digital image, digitization, statistical calculation, enhancement, restoration, segmentation, binarization	曜日時限	

授業概要　Course summary

この科目の目的はディジタル画像処理の基本的な理論と方法を提供することである。下記の題目について、重要な考え方およびその具体的計算方法を、実例を用いて説明する。(1)画像のディジタル化：標本化、量子化、空間周波数。(2)画像の統計計算：ヒストグラム、モーメント等。(3)強調と復元：濃淡変換、雑音除去、線形フィルタ。(4)領域分割：画素類別、クラスタリング、領域の均質性。(5)2値画像の操作：境界追跡、膨張/収縮、細線化、ラベル付け、形状特徴。

The aim of this course is to provide basic theories and methods of processing digital images. The important ideas and their computational embodiments related to the following topics are explained with several illustrative examples. (1) Image digitization: sampling, quantization and spatial frequency. (2) Statistical calculations on a image: histograms, moments, etc. (3) Enhancement and restoration: gray-scale modification, noise reduction and linear filtering. (4) Segmentation: pixel classification, clustering and region homogeneity. (5) Binary image operation: border tracing, dilation/erosion, thinning, labeling, features of shape.

到達目標　Course goal

画像処理とその基礎的手法を理解し，それらの組み合わせにより応用的な画像処理プログラムを作成できること．

Course goal is understanding a basic concept of image processing and basic methods for it, and making an application program by a combination of the methods.

授業内容　Course description

1-3. Introduction, and, image digitization
4-6. Statistical calculations on an image
7-9. Enhancement and restoration
10-12. Segmentation
13-14. Binary image operation
15. Making an application program for the final report.

準備学習（予習・復習）等　Preparation / Review

Review topics of each class by making simple image processing programs which are related to learned techniques and methods to understand them deeper.

授業形式　Class style

講義と演習
Lectures and practices

成績評価の方法・基準　Method of evaluation

演習レポート、および期末レポート
Laboratory reports, and final report

教科書・参考書等　Textbook and material
必要に応じて資料を配付する. A handout will be given for each class if it is needed.

受講要件・予備知識　Prerequisite
C/C++ もしくは Python のプログラミングと線形代数の基礎知識．対面授業を予定． Programming skills for C/C++ or Python, and the basics of linear algebra are a must. Classes are held face-to-face with practices using PC (tentative).

その他の注意事項　Note
機材の都合で最大4名まで Up to 4 students will be accepted from a reason related to the number of camera devices.