**Course Title :** Machine Learning and Lab **2022-1st Semester**

[Sylabus]

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| Course | Category | 전공선택(전공선택) | Instructor | Department or Division | Department of Statistics |
| | Number(section) | 47771(01) | | Name | |
| | Title | Machine Learning and Lab | | Phone | |
| | Credit(Hours) | 3 Credit(4 Hours) | | E-mail | |
| | Type | 강의+실험·실습 | | Homepage | |
| | Time(Room) | Tue 06,07,08/33-710, Thu 01/33-710 | | Office Hour | |
| | School Year | 3/4 year | Assistant | name & Phone | |

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| Grading | Evaluation Method | 절대평가 | | |
| | ☐ Attendance (10%) | ☐ Portfolio (0%) | ☐ Participation (10%) | |
| | ☐ Assignment (20%) | ☐ Quiz (0%) | ☐ Midterm Report (0%) | ☐ Midterm Exam (30%) |
| | ☐ Final Report (0%) | ☐ Final Exam (30%) | ☐ 기타(0%) | |

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| Type | Lecture and Practice , PBL , Foreign Language |
| Teaching Method | Lecture , Practice |
| Plagiarism Policy | It is considered plagiarism to draw any idea or any language from someone else wihout adequately crediting that source in your work. It doesn't matter whether the source is a published author, another student, a Web site without clear authorship, a Web site that sells academic papers, or any other person: Taking credit for antone else's work is stealing, and it is unacceptable in all academic situations, whether you do it intentionally or by accident. |

Any student with a disability is welcome to contact the instructor to get academic accommodations, and may be in touch with the Student Accessibility Services by calling 02-6490-6273 to discuss the process for requesting accommodations.

## Course Objectives

-이 수업은 영어로 진행되는 외국어수업입니다.
(This course will be presented in English)
o 다양한 기계학습 방법의 원리 이해
(Understanding the mechanisms of various machine learning methods)
o 기계학습 방법의 평가의 이해
(Understanding assessment of the performances of machine learning methods)
o 실제 데이터에 적절한 기계학습 방법의 적용
(Building sounds skills in machine learning)

| Course Description | Textbooks and Reference Materials |
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| 본 교과목에서는 R 또는 Python에 기반하여 여러 가지 학습문제에 많이 사용되는 방법론을 소개한다. 주요 토픽으로는 의사결정나무, 신경망 등 여러 가지 지도학습 기법 및 평가 방법, 그리고 연관규칙, 군집, 차원축소 방법 등 자율학습 기법이 있다. | An Introduction to Statistical Learning: with applications in R<br>G. James, D. Witten, T. Hastie, and R. Tibshirani,<br>Springer. |

| Specialty competency | Representative competency |
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| Statistical Modelling | Primary |
| Mathematical Methods | |
| Statistical Data Processing | |
| Statistical Data Analysis | Secondary |
| Programming | |

| Specialty competency | Representative competency |
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| Problem Solving | Secondary |
| Collaboration | |
| Global Competence | |
| Ethics in Statistical Practice and Communication | |

**교과목명 : 기계학습및실습** **2022year 1st Semester**

[주별수업계획서]

| Week | Contents | Teaching Method | Teaching Materials | Requirements, Assignments, etc. |
|---|---|---|---|---|
| 1 | 1. 기계학습의 개괄:<br>1-1. 기계학습이란 무엇인가, 1-2. 모델 평가란 무엇인가<br><br>1. Introduction to Statistical Learning<br>1-1. What is Statistical Learning, 1-2. Assessing Model Accuracy | | Introduction to Statistical LearningCh. 1 & 2. | |
| 2 | 2. 선형모형 I<br>2-1. 단순성형회귀 모형, 2-2. 다중선형회귀모형 I<br><br>2. Linear Regression Part I<br>2-1. Simple Linear regression, 2-2. Multiple Linear Regression | | Introduction to Statistical LearningCh. 3 | |
| 3 | 3. 선형모형 II<br>3-1. 다중선형회귀모형 II, 3-2. 선형모형의 확장<br><br>3. Linear Regression II<br>3-1. Multiple Linear Regression Part 2, 3-2. Other Considerations in the Regression Models | | Introduction to Statistical LearningCh. 3 continued | |
| 4 | 4. 범주화 I<br>4-1. 범주화의 소개, 4-2. 로지스틱 회귀 모형<br><br>4. Classification<br>4-1. An Overview of Classification, 4-2. Logistic Regression | | Introduction to Statistical LearningCh. 4 | |
| 5 | 5. 범주화 II<br>5-1. 재너러티브 모델, 5-2. 다양한 범주화 방법들의 비교<br><br>5. Classification II<br>5-1. Generative Models 5-2. A Comparison of Classification Method | | Introduction to Statistical LearningCh. 4 continued | |
| 6 | 6. 리샘플링<br>6-1. 교차타당화, 6-2. 부트스트랩<br><br>6. Resampling Methods<br>6-1. Cross-Validation, 6-2. Bootstrap | | Introduction to Statistical LearningCh. 5 | |
| 7 | 7. 선형 모델의 선택과 정규화 I<br>7-1. 부분집합 선택법, 7-2. 수축모델<br><br>7. Linear Model Selection and Regularization<br>7-1. Subset Selection, 7-2. Shrinkage Methods | | Introduction to Statistical LearningCh. 6 | |
| 8 | 중간고사<br>Midterm | | | |
| 9 | 9. 선형 모델의 선택과 정규화 II<br>9-1. 차원 축소, 9-2. 고차원과 다중 공선성<br><br>9. Linear Model Selection and Regularization<br>9-1. Dimension Reduction Methods, 9-2. Considerations in High Dimensions | | Introduction to Statistical LearningCh. 6 Continued | |
| 10 | 10. 트리 모형 I<br>10-1. 비선형 방법 소개, 10-2. 트리 방법 소개<br><br>10. Tree Methods I<br>10-1. An Overview of Non-linear Methods, 10-2. An Overview of Tree Methods | | Introduction to Statistical LearningCh. 7 & 8 | |

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| 11 | 11. 트리 Ⅱ<br>11-1. 배깅 방법, 11-2. 랜덤 포레스트, 11-3. 부스팅<br><br>11. Tree Methods Ⅱ<br>11-1. Bagging, 11-2. Random Forests, 11-3. Boosting | | Introduction to Statistical LearningCh. 8 continued | |
| 12 | Supplementary Week | | | |
| 13 | 13. 서포트 백터 머신<br>13-1. 마진과 서포트 백터, 13-2. 서포트 백터 머신<br><br>13. Support Vector Machine<br>13-1. Margins, Classifiers, Support vector, and Support Vector Classifiers, 13-2. Support Vector Machines | | Introduction to Statistical LearningCh. 9 | |
| 14 | 14. 비지도 학습<br>14-1. 주성분 분석, 14-2. 클러스터링 분석<br><br>14. Unsupervised Learning<br>14-1. Principal Component Analysis, 14-2. Clustering Methods | | Introduction to Statistical LearningCh. 10. | |
| 15 | 15. 뉴럴네트워크<br>15-1. 뉴럴네트워크의 소개, 15-2. 뉴럴네트워크의 학습<br><br>15. Neural Networks<br>15-1. An Overview of Neural Networks, 15-2. Neural Network Learning | | Lecture Slides | |
| 16 | 기말고사<br>Final Exam | | | |