

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |         |                                                                |     |        |     |                |             |                             |      |     |  |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|----------------------------------------------------------------|-----|--------|-----|----------------|-------------|-----------------------------|------|-----|--|
| 科目ナンバリング                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |         | U-LAS30 20030 LE10                                             |     |        |     |                |             |                             |      |     |  |
| 授業科目名<br><英訳>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |         | Introduction to Algorithms-E2<br>Introduction to Algorithms-E2 |     |        |     | 担当者所属<br>職名・氏名 |             | 情報学研究科 特定准教授 Jesper Jansson |      |     |  |
| 群                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 情報学科目群  |                                                                |     | 分野(分類) |     | (各論)           |             |                             | 使用言語 | 英語  |  |
| 旧群                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | B群      | 単位数                                                            | 2単位 | 週コマ数   | 1コマ | 授業形態           | 講義 (対面授業科目) |                             |      |     |  |
| 開講年度・<br>開講期                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 2025・後期 |                                                                | 曜時限 | 月2     |     | 配当学年           | 全回生         |                             | 対象学生 | 全学向 |  |
| [授業の概要・目的]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |         |                                                                |     |        |     |                |             |                             |      |     |  |
| <p>An algorithm is a well-defined procedure for solving a computational problem.</p> <p>Reliable algorithms have become crucial components of people's daily lives; for example, the Internet or our smartphones would not work without them.</p> <p>The purpose of this course is to provide a basic introduction to algorithms for non-computer science students. General techniques for designing algorithms and analyzing their efficiency, as well as examples of widely used algorithms with important real-life applications, will be presented.</p>                                          |         |                                                                |     |        |     |                |             |                             |      |     |  |
| [到達目標]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |         |                                                                |     |        |     |                |             |                             |      |     |  |
| <p>After completing this course, the student should be able to:</p> <ul style="list-style-type: none"> <li>- Apply various algorithm design techniques for solving computational problems.</li> <li>- Measure the efficiency of an algorithm.</li> <li>- Explain how famous algorithms such as Google's PageRank, Quicksort, and Dijkstra's shortest-path algorithm work.</li> </ul>                                                                                                                                                                                                                 |         |                                                                |     |        |     |                |             |                             |      |     |  |
| [授業計画と内容]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |         |                                                                |     |        |     |                |             |                             |      |     |  |
| <p>The course will cover the following topics:</p> <ol style="list-style-type: none"> <li>1. Introduction</li> <li>2. Graph traversal</li> <li>3. Data compression</li> <li>4. Cryptography</li> <li>5. Topological sort</li> <li>6. Shortest paths</li> <li>7. PageRank</li> <li>8. Voting systems</li> <li>9. Searching</li> <li>10. Sorting</li> <li>11. Hash tables</li> <li>12. String matching</li> <li>13. Randomization</li> <li>14. Course summary and Q &amp; A session</li> </ol> <p>&lt;&lt;Final examination&gt;&gt;</p> <ol style="list-style-type: none"> <li>15. Feedback</li> </ol> |         |                                                                |     |        |     |                |             |                             |      |     |  |
| [履修要件]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |         |                                                                |     |        |     |                |             |                             |      |     |  |
| <p>An ability to think abstractly and to solve problems of a mathematical nature will be required for this course.</p> <p>No programming skills are needed.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                      |         |                                                                |     |        |     |                |             |                             |      |     |  |
| <div>----- Introduction to Algorithms-E2(2)へ続く ↓ ↓ ↓</div>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |         |                                                                |     |        |     |                |             |                             |      |     |  |

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| Introduction to Algorithms-E2(2)                                                                         |
| [成績評価の方法・観点]                                                                                             |
| A written examination at the end of the course.                                                          |
| [教科書]                                                                                                    |
| P. Louridas 『Real-World Algorithms - A Beginner's Guide』 （The MIT Press, 2017. ISBN-13: 978-0262035705.） |
| [授業外学修（予習・復習）等]                                                                                          |
| Students will be expected to spend about 3 hours per week to prepare for and review the lessons.         |
| [その他（オフィスアワー等）]                                                                                          |
|                                                                                                          |
| [主要授業科目（学部・学科名）]                                                                                         |
|                                                                                                          |