



# **Course Description**

**UEC Exchange program**  
**Japanese University Studies in Science**  
**and Technology (JUSST)**

**Spring Semester, 2018**

**Center for International Programs and Exchange**  
**The University of Electro-Communications**



国立大学法人  
**電気通信大学**

**UEC JUSST Program Course Description**

Japanese University Studies in Science and Technology (JUSST)

Center for International Programs and Exchange (CIPE)

The University of Electro-Communications

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# JUSST Program Course Requirements

|  | Subject  | 1 <sup>st</sup> Semester   | 2 <sup>nd</sup> Semester  |
|--|--|--|---|
| CORE SUBJECTS                              | LAB WORK<br>Research / Project<br>(Required for JUSST student) | [ UNDERGRADUATE STUDENTS ]<br><u>Individual Study Project</u> under the supervision of UEC<br>faculty member. Minimum 8 hours/week<br>5 Credits/one academic year (2 Credits/one semester) |   |
|  |  | [ GRADUATE STUDENTS ]<br><u>Independent Research Project</u> under the supervision of UEC<br>Faculty member. Minimum 8 hours/week<br>6 Credits/one academic year (3 Credits/one semester)  |   |
|  | Academic Skills I  | 2 hours/week (2 Credits)   | —   |
|  | Academic Skills II   |  |   |
|  | Academic Skills III  | —  | 2 hours/week (2 Credits)  |
|  | Japanese Language  | Elementary / Intermediate / Advanced *<br>8 - 14 hours/week (6 - 7 Credits)  |   |
|  | Science and<br>Engineering Subjects<br>( ELECTIVE )            | [ UNDERGRADUATE STUDENTS ]<br>Need to pass <u>3 subjects</u> at minimum **<br>in <i>Each Semester</i>  |   |
|  |  | [ GRADUATE STUDENTS ]<br>Need to pass <u>3 subjects</u> at minimum **<br>in <i>One Academic Year</i>   |   |
|  |  | Electronic Experiment Lab.<br>4 hours/week (2 Credits)<br>Required for all Undergraduate Students<br>Only offered in the FALL Semester   |   |
|  | FREE ELECTIVE  | Research Presentation  | 2 hours/week (2 Credits)<br>Offered in the SPRING Semester only |
| Reading Scientific Research                |  |  |   |
| English for Interpersonal<br>Communication |  | 2 hours/week (2 Credits)<br>Offered in the FALL Semester only  |   |
| Preparation for Graduate<br>School         |  |  |   |
| Sports Classes                             |  | —  | 2 hours/week (1 Credit)   |

\*) Japanese language classes are exempted for Graduate Students in their 2<sup>nd</sup> semester.

\*\*) Students are highly recommended to take scientific & Engineering courses, at least one subject more than the minimum requirement in order to ensure your successful completion of JUSST program. (Form D)

## ii

National holiday

**@ JUSST students Weekly Meeting on every Wed (start from 16:30)**

## JUSST Program Course Time-Table for Spring Semester, 2018

平成30年度春学期（前期）短期留学プログラム時間割

| Day<br>曜日 | Period<br>授業時間 | Subject 授業名  | Department<br>学科等 | Lecturer 教員名                | Classroom<br>教室 | Note 備考  |
|-----------|----------------|--|-------------------|-----------------------------|-----------------|--|
| Mon<br>月  | 1              |  |                   |                             |                 |  |
|           | 2              | Advanced Engineering Science III (Advanced Quantum Mechanics)                                | S                 | WATANABE Shin-ichi (渡邊 信一)  | E6-237          |  |
|           |                | VLSI Low Power Circuit Design  | I                 | ISHIBASHI Koichiro (石橋 孝一郎) | W2-106          |  |
|           | 3              |  |                   |                             |                 |  |
|           | 4              |  |                   |                             |                 |  |
| Tue<br>火  | 5              | Advanced Communication Engineering and Informatics II (Optical Communication Engineering)    | I                 | KISHI Naoto (来住 直人)         | E6-201          |  |
|           | 1              | UEC Academic Skills I (Computer Literacy)  | CIPE              | CHOO                        | C-401           | Old C building<br>(Computer room)  |
|           | 2              | UEC Academic Skills II (Information literacy and Research)                                   | CIPE              | CHOO                        | C-401           |  |
|           |                | Life Long Learning Sports (for Senior student only)  | SPORTS            | ANDO Soichi (安藤 創一)         |                 | *  |
|           | 3              | Japanese Language (日本語)  | CIPE              |                             |                 |  |
|           | 4              | Japanese Language (日本語)  | CIPE              |                             |                 |  |
| Wed<br>水  | 5              |  |                   |                             |                 |  |
|           | 1              | Advanced Engineering Science I (Modern Optics and Photonics)                                 | S                 | TOMITA Yasuo (富田 康生)        | W1-214          |  |
|           |                | Introduction to Computational Methods in Science and Engineering                             | M                 | MATUTTIS Hans-Georg         | C-401           | Computer Room  |
|           | 2              | Japanese Language (日本語)  | CIPE              |                             |                 |  |
|           | 3              | Japanese Language (日本語)  | CIPE              |                             |                 |  |
|           | 4              | Japanese Language (日本語)  | CIPE              |                             |                 |  |
|           |                | Reading Scientific Research  | HLSS              | SHI Jie (史 傑)               | E1-606          |  |
| Thu<br>木  | 5              | Research Presentation  | HLSS              | SHI Jie (史 傑)               | E1-606          |  |
|           | 1              | UEC Academic Skills III (Publishing literacy and Research)                                   | CIPE              | CHOO                        | E3 1st floor    | Computer Room  |
|           | 2              | Advanced Theory of Systems Reliability   | J                 | JIN Lu (金 路)                | W5-209          |  |
|           | 3              |  |                   |                             |                 |  |
|           | 4              | Topics in Informatics II (Sustainable Supply Chain Management)                               | J                 | YAMADA Tetsuo (山田 哲男)       | W5-209          | 4/19 (1st class begin)   |
| Fri<br>金  | 5              |  |                   |                             |                 |  |
|           | 1              | Japanese Language (日本語)  | CIPE              |                             |                 |  |
|           | 2              | Japanese Language (日本語)  | CIPE              |                             |                 |  |
|           | 3              | Advanced Engineering Science II (Photonics and Opto-electronics)                             | S                 | UENO Yoshiyasu (上野 芳康)      | W2-106          |  |
|           | 4              |  |                   |                             |                 |  |
| Sat<br>土  | 5              |  |                   |                             |                 |  |
|           | 1              | Advanced Communication Engineering and Informatics I (Information and Communication Network) | I                 | OKI Eiji (大木 英司)            | A101            | Intensive Courses<br>4/14, 4/28, 5/12,<br>6/2 (Mid-term exam), 6/9,<br>6/23, 7/14, 7/28 (final exam) |
|           | 2              |  |                   |                             |                 |  |

## Department 学科等

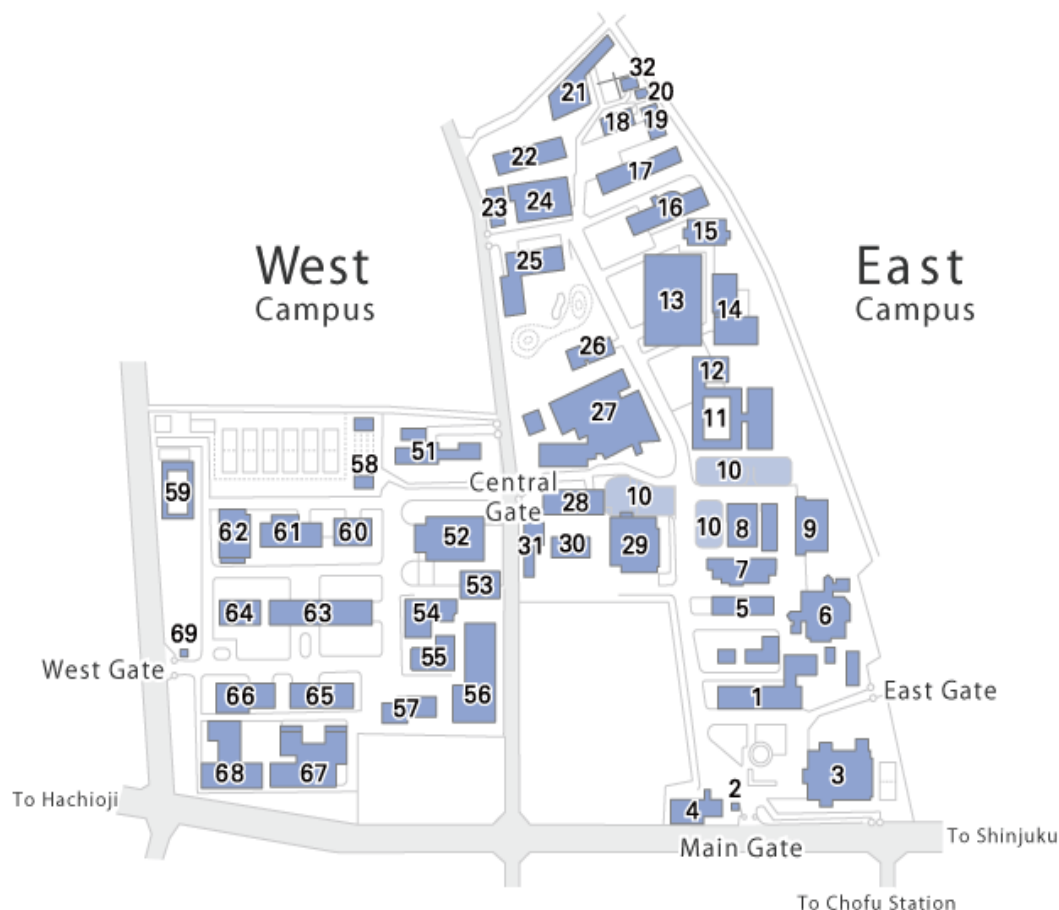
**J:** Department of Informatics (情報学専攻)  
**I:** Department of Computer and Network Engineering (情報・ネットワーク工学専攻)  
**M:** Department of Mechanical and Intelligent Systems Engineering (機械知能システム工学専攻)  
**S:** Department of Engineering Science (基盤理工学専攻)  
**CIPE:** Center for International Programs and Exchange (国際教育センター)  
**SPORTS:** UEC Physical Education Division (健康・スポーツ科学部会)  
**HLSS:** The Division of Humanities Languages and Social Sciences (総合文化部会)

## Period 授業時間

1: 9:00-10:30  
 2: 10:40-12:10  
 3: 13:00-14:30  
 4: 14:40-16:10  
 5: 16:15-17:45  
 6: 17:50-19:20  
 7: 19:30-21:00

\* for 2nd semester students only

# UEC CAMPUS MAP



- Main Building (1)
- Auditorium (3)
- 80th Anniversary Memorial Hall (4)
- Building E-1 (7)
- Building E-2 (28)
- Building E-3 (27)
- Building E-4 (11)
- Building E-5 (12)
- Building E-6 (13)
- Building E-7 (14)
- Building E-8 (15)
- Building E-9 (16)
- Building E-10 (17)
- Building A (5)
- Building B (6)
- Building C (8)
- Building D (9)
- Communication Park (10)
- University Center (29)
- Health Care Center (26)
- International House (21)
- Facilities for Extracurricular Activities (22)
- Judo Gymnasium (31)
- Personnel Clubhouse (20)
- Child-Care Facility (32)
- Building E-31 (18)
- Building E-32 (19)
- Building E-33 (23)
- Building E-34 (24)
- Building E-35 (25)
- Building E-36 (30)
- Security Office of the Main Gate (2)
- Building W-1 (65)
- Building W-2 (63)
- Building W-3 (66)
- Building W-4 (64)
- Building W-5 (54)
- Building W-6 (60)
- Building W-7 (61)
- Building W-8 (67)
- Building W-9 (68)
- Building W-10 (56)
- Building W-11 (62)
- Gymnasium (52)
- Gymnasium II (53)
- Archery Facility (58)
- Swimming Pool (59)
- West Cafeteria (55)
- Student Dormitory (51)
- Building W-31 (57)
- Security Office of West Gate (69)
- Center for International Programs and Exchange (28)
- University Library (27)
- Information Technology Center (27)
- Coordinated Center for UEC Research Facilities (13)
- Center for Industrial and Governmental Relations (14)
- Advanced Wireless Communication Research Center (17)
- UEC Museum of Communication (17)
- Center for Developing e-Learning (66)
- Institute for Laser Science (61)
- Center for Community Relations (1)
- Innovation Research Center for Fuel Cells (16)
- Center for Photonic Innovation (62)
- Research Center for Ubiquitous Networking and Computing (66)
- Advanced Ultrafast Laser Research Center (62)

# UEC Academic Skills I (Computer Literacy)

## General Information

|                                |   |                                    |                                       |
|--------------------------------|---|------------------------------------|---------------------------------------|
| <b>Course title (Japanese)</b> | UEC Academic Skills I (Computer Literacy) (上級科目)                                |                                    |                                       |
| <b>Course title (English)</b>  | UEC Academic Skills I (Computer Literacy)                                       |                                    |                                       |
| <b>Academic year</b>           | 2018  | <b>Year offered</b>                | 3/4                                   |
| <b>Semester(s) offered</b>     | Spring semester   | <b>Faculty offering the course</b> | School of Informatics and Engineering |
| <b>Teaching method</b>         | Lecture   | <b>Credits</b>                     | 2                                     |
| <b>Category</b>                | General culture subjects  |                                    |                                       |
| <b>Cluster/Department</b>      | School of Informatics and Engineering   |                                    |                                       |
| <b>Lecturer(s)</b>             | Choo Cheow Keong  |                                    |                                       |
| <b>Office</b>                  | East 2-305  |                                    |                                       |
| <b>e-mail</b>                  | uec-as1@jusst.fedu.uec.ac.jp  |                                    |                                       |
| <b>Course website</b>          | <a href="http://www.fedu.uec.ac.jp/skills">http://www.fedu.uec.ac.jp/skills</a> |                                    |                                       |
| <b>Last updated</b>            | 2018/02/15 20:21:44   | <b>Update status</b>               | Released                              |

## Course Description

|  |   |
|--|---|
| <b>Topic and goals</b>                           | This course gives the students the intermediate-advanced knowledge of computer systems and computer networks in a typical academic environment. The lecture stresses fundamental tools and techniques that are applicable to a broad reach of systems such as the use of primitive, but powerful tools as UNIX shell, HTML, LaTeX.  |
| <b>Prerequisites</b>                             | NIL   |
| <b>Recommended prerequisites and preparation</b> | コンピューターリテラシー<br>Computer literacy   |
| <b>Course textbooks and materials</b>            | NIL   |
| <b>Course outline and weekly schedule</b>        | <p>Course schedule and topics that will be covered</p> <p>=====</p> <ol style="list-style-type: none"> <li>1. Introduction (Usage: The Information Technology Center ITC, UEC campus network use policies)</li> <li>2. Computer operating system and Tools (fundamentals)</li> <li>3. Unix operating system (fundamentals)</li> <li>4. Unix operating system (The Internet and computer network)</li> <li>5. Word Processing (Basic; Desktop publishing, WYSIWYG, and LaTeX)</li> <li>6. LaTeX (Environments and layout; LaTeX commands, Structure, Package, Class, style, Text typesetting)</li> <li>7. LaTeX (Mathematical Formulas)</li> <li>8. LaTeX (Displayed; Lists, Tabulator, Tables)</li> <li>9. LaTeX (Displayed; Graphics, Drawing)</li> <li>10. LaTeX (Labels, Cross-referencing, Citations and Bibliography)</li> <li>11. World Wide Web (Overview; Web systems, applications, HTML)</li> <li>12. HTML (Basic; Structure, Tag, color, typesetting)</li> <li>13. HTML (Links and Multimedia; Images, Sound, and Movies)</li> <li>14. HTML (Forms, Tables, and Frames)</li> <li>15. HTML (Interactivity, Cascading Style Sheet; CSS)</li> </ol> <p>=====</p> <p>This course is intended to be a lecture in combination with a practical exercise ("learn, practice, implement and apply") that will cover the usage of the UNIX system, and including how to write in LaTeX and HTML.</p> <p>Note that the lecture schedule is subject to constant revisions throughout the course.</p> |
| <b>Preparation and review outside class</b>      | Students have to create/design a homepage and present it in class at the end of the semester. Thus, student may need some extra time to create the homepage.  |



|                               |   |
|-------------------------------|---|
| <b>Evaluation and grading</b> | <p>Evaluation is given as follows; (Tasks 50%, Mid-Semester presentation 30%, Final presentation 20%)</p> <p>Since this course is a practical course, attendance and participation in class is obligatory. Only students who have 1) maintained at least 70% of the attendance, 2) submitted all the assignments and 3) made their Mid-semester &amp; final presentations can obtain the credits.</p> |
| <b>Office hours</b>           | 12:00-13:00, for just-in-case, schedule an appointment before walking in.   |
| <b>Message for students</b>   | We expect students to be the active part of the learning process. We encourage the students' participation in class discussions, asking questions and interacting with others. If you have any comments on the topics covered, please feel free to share with the others in class.  |
| <b>Others</b>                 | Students are expected to come to class on time. Absences are excused in case of emergency, illness, or trips to conferences.  |
| <b>Keyword(s)</b>             | Unix, HTML, Latex   |

# UEC Academic Skills II (Information Literacy and Research)

## General Information

|                                |   |                                    |                                       |
|--------------------------------|---|------------------------------------|---------------------------------------|
| <b>Course title (Japanese)</b> | UEC Academic Skills II (Information Literacy and Research) (上級科目)               |                                    |                                       |
| <b>Course title (English)</b>  | UEC Academic Skills II (Information Literacy and Research)                      |                                    |                                       |
| <b>Academic year</b>           | 2018  | <b>Year offered</b>                | 3/4                                   |
| <b>Semester(s) offered</b>     | Spring semester   | <b>Faculty offering the course</b> | School of Informatics and Engineering |
| <b>Teaching method</b>         | Lecture   | <b>Credits</b>                     | 2                                     |
| <b>Category</b>                | General culture subjects  |                                    |                                       |
| <b>Cluster/Department</b>      | School of Informatics and Engineering   |                                    |                                       |
| <b>Lecturer(s)</b>             | Choo Cheow Keong  |                                    |                                       |
| <b>Office</b>                  | East 2-305  |                                    |                                       |
| <b>e-mail</b>                  | uec-as2@jusst.fedu.uec.ac.jp  |                                    |                                       |
| <b>Course website</b>          | <a href="http://www.fedu.uec.ac.jp/skills">http://www.fedu.uec.ac.jp/skills</a> |                                    |                                       |
| <b>Last updated</b>            | 2018/02/15 20:21:59   | <b>Update status</b>               | Released                              |

## Course Description

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|--|--|
| <b>Topic and goals</b>                           | This course is designed to foster students' ability to identify, evaluate and use diverse information sources effectively in science and engineering studies. It involves the knowledge of information technology tools and their application to research. Students are required to give a poster presentation on their major study or research at the end of the semester.  |
| <b>Prerequisites</b>                             | UEC Academic Skills I (Computer Literacy) or コンピューターリテラシー  |
| <b>Recommended prerequisites and preparation</b> | NIL  |
| <b>Course textbooks and materials</b>            | NIL  |
| <b>Course outline and weekly schedule</b>        | <p>Course schedule and topics that will be covered</p> <p>=====</p> <ol style="list-style-type: none"> <li>1. Introduction (Usage: The Information Technology Center etc.)</li> <li>2. Academic Integrity (Referencing, citing)</li> <li>3. Mind mapping, brain storming</li> <li>4. Scientific literatures and resources retrieval 1/2</li> <li>5. Scientific literatures and resources retrieval 2/2 (UEC Library)</li> <li>6. Managing resources</li> <li>7. Managing, accessing and sharing resources, and Create bibliographies</li> <li>8. Logical and Critical reading (comprehend, examine, evidence, utilize)</li> <li>9. Graphical information (Inkscape, GIMP)</li> <li>10. Tables, Graphs, Charts, Diagrams and Timelines (SciDAVis)</li> <li>11. Formula editor (word processing and computation)</li> <li>12. Desktop publishing for poster presentation (Scribus)</li> <li>13. Preparation for presentation</li> <li>14. Poster presentation 1/2</li> <li>15. Poster presentation 2/2</li> </ol> <p>=====</p> <p>The course gives an introduction to the use of some powerful tools for scientific research and engineering, and the lectures include hands-on learning and applicable exercises.</p> <p>Note that the lecture schedule is subject to constant revisions throughout the course.</p> |
| <b>Preparation and review outside class</b>      | Students have to read 1 to 3 articles about varied topics and in the final exam, students are expected to make a postal presentation.  |
| <b>Evaluation and grading</b>                    | Evaluation is given as follows; (Assignments 50%, midterm presentation 20%, Poster presentation 30%)   |

|                             |  |
|-----------------------------|--|
|                             | Since this course is a practical course, attendance and participation in class is obligatory. Only students who have 1) maintained at least 70% of attendance, 2) submitted all the assignments and 3) made their poster presentations can obtain the credits.                     |
| <b>Office hours</b>         | 12:00-13:00, for just-in-case, schedule an appointment before walking in.  |
| <b>Message for students</b> | We expect students to be the active part of the learning process. We encourage the students' participation in class discussions, asking questions and interacting with others. If you have any comments on the topics covered, please feel free to share with the others in class. |
| <b>Others</b>               | Students are expected to come to class on time. Absences are excused in case of emergency, illness, or trips to conferences.   |
| <b>Keyword(s)</b>           | Research, library, Desktop publishing, poster presentation   |

# UEC Academic Skills III (Publishing Literacy and Research)

## General Information

|                                |   |                                    |                                       |
|--------------------------------|---|------------------------------------|---------------------------------------|
| <b>Course title (Japanese)</b> | UEC Academic Skills III (Publishing Literacy and Research)                      |                                    |                                       |
| <b>Course title (English)</b>  | UEC Academic Skills III (Publishing Literacy and Research)                      |                                    |                                       |
| <b>Academic year</b>           | 2018  | <b>Year offered</b>                | 3/4                                   |
| <b>Semester(s) offered</b>     | Fall semester   | <b>Faculty offering the course</b> | School of Informatics and Engineering |
| <b>Teaching method</b>         | Lecture   | <b>Credits</b>                     | 2                                     |
| <b>Category</b>                | General culture subjects  |                                    |                                       |
| <b>Cluster/Department</b>      | School of Informatics and Engineering   |                                    |                                       |
| <b>Lecturer(s)</b>             | Choo Cheow Keong  |                                    |                                       |
| <b>Office</b>                  | East 2-305  |                                    |                                       |
| <b>e-mail</b>                  | uec-as3@jusst.fedu.uec.ac.jp  |                                    |                                       |
| <b>Course website</b>          | <a href="http://www.fedu.uec.ac.jp/skills">http://www.fedu.uec.ac.jp/skills</a> |                                    |                                       |
| <b>Last updated</b>            | 2018/02/15 20:26:52   | <b>Update status</b>               | Released                              |

## Course Description

|  |  |
|--|--|
| <b>Topic and goals</b>                           | This course focuses attention on the exercise of strategic research project. Students are required to carry out a study/research project for more than a half of year with a specific topic. Then, they have to proceed their own project after they choose their own topic and make a monthly plan. At the end of the semester, there will be an international mini-conference that has participants of all the JUSST Exchange Students and other regular UEC Students. Students are required to give a presentation on their research-based projects.  |
| <b>Prerequisites</b>                             | UEC Academic Skills I (Computer Literacy) or コンピューターリテラシー  |
| <b>Recommended prerequisites and preparation</b> | UEC Academic Skills II (Information Literacy and Research)   |
| <b>Course textbooks and materials</b>            | NIL  |
| <b>Course outline and weekly schedule</b>        | <p>Course schedule and topics that will be covered</p> <p>=====</p> <ol style="list-style-type: none"> <li>1. Introduction (Usage: The Information Technology Center etc.)</li> <li>2. Academic Integrity (interesting and Unpublished, Scientific misconduct)</li> <li>3. Researcher's outputs (Why, How, Where)</li> <li>4. Planning the research/research protocol (LaTeX editor, Mind mapping, brainstorming etc.)</li> <li>5. Proposing and Reporting on Research</li> <li>6. Making a scientific presentation</li> <li>7. Midterm Presentation 1/2</li> <li>8. Midterm Presentation 2/2</li> <li>9. Brush up on your skills (Handling Q&amp;A)</li> <li>10. Communication and Correspondence (Peer, Researcher, Editor, etc.)</li> <li>11. Academic publishing (Overviews; Dissertation, Monograph, Scientific paper )</li> <li>12. Academic publishing (Procedures, Processes and standards)</li> <li>13. Assessment and evaluation</li> <li>14. Oral presentation 1/2</li> <li>15. Oral presentation 2/2</li> </ol> <p>=====</p> <p>This course is designed to support the pursuit of writing research paper and share the skills of quality publishing. The lectures are linked with practical activities, and the final assignment requires that each student to publishing and presenting a research paper/article in a mock conference (in class for regular student).</p> <p>Note that the lecture schedule is subject to constant revisions throughout the course.</p> |

|   |   |
|---|---|
| <b>Preparation and review outside class</b> | <p>Students have to read 2 to 3 articles about varied topics and at the mid and end of the semester, the students are expected to make an oral presentation.</p> <p>For laboratory assigned students, the essential project hours are estimated for more than 8 hours a week, where this is the same standard of graduate thesis project.</p>                         |
| <b>Evaluation and grading</b>               | <p>Evaluation is given as follows; (Assignments 40%, Writing paper 30%, Oral presentation 30%)</p> <p>Since this course is a practical course, attendance and participation in class is obligatory. Only students who have 1) maintained at least 70% of attendance, 2) submitted the writing paper and 3) made their final presentations can obtain the credits.</p> |
| <b>Office hours</b>                         | 12:00-13:00, for just-in-case, schedule an appointment before walking in.   |
| <b>Message for students</b>                 | We expect students to be the active part of the learning process. We encourage the students' participation in class discussions, asking questions and interacting with others. If you have any comments on the topics covered, please feel free to share with the others in class.  |
| <b>Others</b>                               | Students are expected to come to class on time. Absences are excused in case of emergency, illness, or trips to conferences.  |
| <b>Keyword(s)</b>                           | Research, Publishing paper, oral presentation   |

# Research Presentation

## General Information

|                                |                                       |                                    |                                       |
|--------------------------------|---------------------------------------|------------------------------------|---------------------------------------|
| <b>Course title (Japanese)</b> | Research Presentation                 |                                    |                                       |
| <b>Course title (English)</b>  | Research Presentation                 |                                    |                                       |
| <b>Academic year</b>           | 2018                                  | <b>Year offered</b>                | 3/4                                   |
| <b>Semester(s) offered</b>     | Spring semester                       | <b>Faculty offering the course</b> | School of Informatics and Engineering |
| <b>Teaching method</b>         | Lecture                               | <b>Credits</b>                     | 2                                     |
| <b>Category</b>                | General culture subjects              |                                    |                                       |
| <b>Cluster/Department</b>      | School of Informatics and Engineering |                                    |                                       |
| <b>Lecturer(s)</b>             | Shi Jie                               |                                    |                                       |
| <b>Office</b>                  | E1-609                                |                                    |                                       |
| <b>e-mail</b>                  | shi.jie@uec.ac.jp                     |                                    |                                       |
| <b>Course website</b>          | Nil                                   |                                    |                                       |
| <b>Last updated</b>            | 2018/03/09 15:32:56                   | <b>Update status</b>               | Released                              |

## Course Description

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| <b>Topic and goals</b>                           | This course is designed for the students who intend to continue to study in the graduate school and have little previous experiences conducting academic research and making presentations. Students will first learn the basic research elements, e.g. research methods, and how to compile research data using computer aided devices, and then learn and experience how to make presentations in English, e.g. making presentation files and delivery methods.  |
| <b>Prerequisites</b>                             | All required English courses in first and second years at UEC.   |
| <b>Recommended prerequisites and preparation</b> | Technical English course for undergraduates  |
| <b>Course textbooks and materials</b>            | Textbooks and reading materials will be prepared by the teacher.   |
| <b>Course outline and weekly schedule</b>        | This course has the following core parts:<br>Weeks 1-3: Basic elements of research. Research methodology for science and humanity majors.<br>Weeks 4-7: Data and results making and analysis in English. Compiling data into visuals.<br>Week 8-10: How to create research presentation files using computer-aided devices and software, e.g. how to use Power-Point software, file organization (outline and structure), design, and documentation, etc.<br>Weeks 11-13: Delivery of presentation in English, e.g. delivery methods, fluency, pronunciation, body language, verbal skills, how to manage nervousness, eye-contact and how to handle Q&A.<br>Weeks 14-15: Conducting presentations & Course evaluation |
| <b>Preparation and review outside class</b>      | Students will need to work outside of class on their research, projects and presentations.   |
| <b>Evaluation and grading</b>                    | This course adopts an accumulative grading system which divides the final grades into percentages. It is important to note that there will NOT be a final test that counts for 100% of your grade. Those students who are absent for two times or more without any official excuses will not be eligible for Grade "S"; Those students who miss over 30% of total classes without any official excuses will fail automatically.<br><br>In-class Performance: 20%<br>Presentations: 40%<br>Essay: 20%<br>Tests: 20%   |
| <b>Office hours</b>                              | Office Hours: Period 2, Tuesday.   |
| <b>Message for students</b>                      | Your attendance and your participation in class activities are two of the most important elements of the course and your achievement. You must try to use English in class all the time. Inappropriate use of Japanese in class will be considered unacceptable behaviors in class and will lead to lower final grade. You are encouraged to ask questions actively in class. In addition, you   |

|                   |  |
|-------------------|--|
|                   | are expected to make contributions to the class materials and group collaboration for research and group work. |
| <b>Others</b>     | Nil  |
| <b>Keyword(s)</b> | Research, presentation, impromptu speech, group work, visuals  |

# Reading Scientific Research

## General Information

|                                |                                       |                                    |                                       |
|--------------------------------|---------------------------------------|------------------------------------|---------------------------------------|
| <b>Course title (Japanese)</b> | Reading Scientific Research           |                                    |                                       |
| <b>Course title (English)</b>  | Reading Scientific Research           |                                    |                                       |
| <b>Academic year</b>           | 2018                                  | <b>Year offered</b>                | 3/4                                   |
| <b>Semester(s) offered</b>     | Spring semester                       | <b>Faculty offering the course</b> | School of Informatics and Engineering |
| <b>Teaching method</b>         | Lecture                               | <b>Credits</b>                     | 2                                     |
| <b>Category</b>                | General culture subjects              |                                    |                                       |
| <b>Cluster/Department</b>      | School of Informatics and Engineering |                                    |                                       |
| <b>Lecturer(s)</b>             | Shi Jie                               |                                    |                                       |
| <b>Office</b>                  | East 1 -609                           |                                    |                                       |
| <b>e-mail</b>                  | shi.jie@uec.ac.jp                     |                                    |                                       |
| <b>Course website</b>          | NIL                                   |                                    |                                       |
| <b>Last updated</b>            | 2018/03/09 15:30:33                   | <b>Update status</b>               | Released                              |

## Course Description

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| <b>Topic and goals</b>                           | In this course, students learn the genre-based characteristics about scientific English language, journal articles and other genres that are related to UEC disciplines and research areas. Group discussions and presentations are required.  |
| <b>Prerequisites</b>                             | NIL  |
| <b>Recommended prerequisites and preparation</b> | NIL  |
| <b>Course textbooks and materials</b>            | Not fixed  |
| <b>Course outline and weekly schedule</b>        | <p>Each class will consist of topic-oriented discussions, reading and mini presentations. Article reading is conducted in the following style.<br/>(The syllabus is subject to change)</p> <p>Week 1: Orientation, Self-Introduction, Course Introduction<br/>           Week 2: Understanding scientific research: genres and linguistic characteristics<br/>           Week 3: Group reading and summary, presentation<br/>           Week 4: Group reading and summary, presentation<br/>           Week 5: Understanding scientific research: genres and linguistic characteristics<br/>           Week 6: Individual choice of reading and summary, presentation<br/>           Week 7: Individual choice of reading and summary, presentation<br/>           Week 8: Individual choice of reading and summary, presentation<br/>           Week 9: Critical reading: Ted.com and reaction<br/>           Week 10: Critical reading: logical persuasion<br/>           Week 11: Critical reading: analyzing<br/>           Week 12: Critical reading: synthesizing<br/>           Week 13: Critical reading: evaluation<br/>           Week 14: Critical writing<br/>           Week 15: Review and Course Evaluation</p> |
| <b>Preparation and review outside class</b>      | Article reading, group work, Ted.com   |
| <b>Evaluation and grading</b>                    | In-class performance and attitude: 20%<br>Reading and presentation projects: 60%<br>Homework and group work: 20%   |
| <b>Office hours</b>                              | Tue 4  |
| <b>Message for students</b>                      | Be logical. Be efficient. Be communicative.  |
| <b>Others</b>                                    | NIL  |



|                   |   |
|-------------------|---|
| <b>Keyword(s)</b> | reading, research, autonomous learning, critical thinking, presentation, group discussion |
|-------------------|---|

# Advanced Engineering Science III (Advanced Quantum Mechanics)

## General Information

|                                |   |                                    |                  |
|--------------------------------|---|------------------------------------|------------------|
| <b>Course title (Japanese)</b> | Advanced Engineering Science III (Advanced Quantum Mechanics)                   |                                    |                  |
| <b>Course title (English)</b>  | Fundamentals of Quantum Physics   |                                    |                  |
| <b>Academic year</b>           | 2018  | <b>Year offered</b>                | All              |
| <b>Semester(s) offered</b>     | Spring semester   | <b>Faculty offering the course</b> | Master's Program |
| <b>Teaching method</b>         | Lecture   | <b>Credits</b>                     | 2                |
| <b>Category</b>                | Graduate school specialized education subjects - Collaborative special subjects |                                    |                  |
| <b>Cluster/Department</b>      | Department of Engineering Science   |                                    |                  |
| <b>Lecturer(s)</b>             | WATANABE Shinichi (渡邊 信一)   |                                    |                  |
| <b>Office</b>                  | E6-521  |                                    |                  |
| <b>e-mail</b>                  | shin.watanabe@PC (replace PC with uec.ac.jp)                                    |                                    |                  |
| <b>Course website</b>          | NA  |                                    |                  |
| <b>Last updated</b>            | 2018/03/15 16:21:13   | <b>Update status</b>               | Released         |

## Course Description

|  |   |
|--|---|
| <b>Topic and goals</b>                           | <p>The theme and goal of this course will be based on "Advanced Quantum Mechanics" this year.</p> <p>Subject: We aim to master the fundamental principle of quantum phenomenon which is essential to science and technology of contemporary society.</p> <p>Achievement goal: To learn quantum treatment of angular momentum, approximation methods, scattering problem, interaction between matter and radiation field, and to deepen the understanding of natural phenomena therewith, and also to understand the quantization of the radiation field.</p>  |
| <b>Prerequisites</b>                             | On top of topics in undergraduate level quantum mechanics, we learn about approximation methods not dealt with in quantum mech I and II, and the interaction of light and matter.   |
| <b>Recommended prerequisites and preparation</b> | Analytical mechanics, applied mathematics<br>(Preferably some knowledge of applied math. Common knowledge of basic math for engineering courses such as elementary calculus, linear algebra, the Fourier series and integrals.)   |
| <b>Course textbooks and materials</b>            | <p>Textbook: 「量子力学II」 江沢 洋著 (裳華房)</p> <p>Reference materials:</p> <p>「量子力学II」 小出昭一郎著 (裳華房)</p> <p>「量子力学上下」 シッフ著 (吉岡書店)</p>  |
| <b>Course outline and weekly schedule</b>        | <p>The theme and goal of this course will be based on "Advanced Quantum Mechanics" this year.</p> <p>(Course content)</p> <ol style="list-style-type: none"> <li>1. Review of elementary quantum mechanics</li> <li>2. Theory of time-development perturbation 1</li> <li>3. Theory of time-development perturbation 2</li> <li>4. Application of perturbation theory</li> <li>5. Principle of Variational Method</li> <li>6. Elementary example of the variational method</li> <li>7. Handling of helium atoms by variational method</li> <li>8. Essence of scattering problem</li> <li>9. Box quantization</li> <li>10. From the transition probability to the differential sectional area: the case of Yukawa potential</li> <li>11. Elementary quantization and application of the radiation field</li> <li>12. Electromagnetic field in free space</li> <li>13. Electronic Hamiltonian</li> <li>14. Emission and absorption of radiation Part 1</li> <li>15. Emission and absorption of radiation Part 2</li> </ol> <p>(How to proceed) The course centers on lectures and simple exercises. If the students are found to be familiar with the subject, emphasis is placed on the part after the perturbation theory.</p> <p>Note: The contents are subject to change without notice. Especially, this year we are considering</p> |

|   |   |
|---|---|
|   | new topics with a view to rapid progress of science in recent years.  |
| <b>Preparation and review outside class</b> | There are numerous enlightening books on quantum mechanics. It is beneficial for the student to be acquainted with such books.  |
| <b>Evaluation and grading</b>               | <p>a) Evaluation:<br/>           Grades will be based on mid-term and final reports unless otherwise announced.</p> <p>b) Criteria:<br/>           The credits may be earned if the following conditions are met.</p> <ol style="list-style-type: none"> <li>1. To be able to solve elementary problems using approximation methods.</li> <li>2. To be able to understand simple scattering problems.</li> <li>3. To be able to understand the interaction of matter with light.</li> </ol> |
| <b>Office hours</b>                         | Questions will be accepted immediately after class. If time permitting, a meeting will be arranged by way of a prior appointment by phone or e-mail.  |
| <b>Message for students</b>                 | Please make an effort to understand the logical structure and flow of quantum mechanics as a whole.   |
| <b>Others</b>                               | Please spend time on the materials before and after each class. Also pay attention to quantum phenomena around us.  |
| <b>Keyword(s)</b>                           | Quantum mechanics, time-dependent perturbation theory, scattering problem.  |

# VLSI Low Power Circuit Design

## General Information

|                                |   |                                    |                  |
|--------------------------------|---|------------------------------------|------------------|
| <b>Course title (Japanese)</b> | VLSI Low Power Circuit Design   |                                    |                  |
| <b>Course title (English)</b>  | VLSI Low Power Circuit Design   |                                    |                  |
| <b>Academic year</b>           | 2018  | <b>Year offered</b>                | All              |
| <b>Semester(s) offered</b>     | Spring semester   | <b>Faculty offering the course</b> | Master's Program |
| <b>Teaching method</b>         | Lecture   | <b>Credits</b>                     | 2                |
| <b>Category</b>                | Graduate school core education subjects (Collaborative core subjects)               |                                    |                  |
| <b>Cluster/Department</b>      | Department of Communication Engineering and Informatics                             |                                    |                  |
| <b>Lecturer(s)</b>             | ISHIBASHI Koichiro (石橋 孝一郎)   |                                    |                  |
| <b>Office</b>                  | W2-306  |                                    |                  |
| <b>e-mail</b>                  | ishibashi@ee.uec.ac.jp  |                                    |                  |
| <b>Course website</b>          | <a href="http://mtm.es.uec.ac.jp/index.html">http://mtm.es.uec.ac.jp/index.html</a> |                                    |                  |
| <b>Last updated</b>            | 2018/03/04 18:33:20   | <b>Update status</b>               | Released         |

## Course Description

|  |   |
|--|---|
| <b>Topic and goals</b>                           | VLSI Low Power Circuit Design   |
| <b>Prerequisites</b>                             | Fundamental electric circuit theorems   |
| <b>Recommended prerequisites and preparation</b> | Fundamental electric circuit theorems   |
| <b>Course textbooks and materials</b>            | Original lecture materials will be delivered on the class   |
| <b>Course outline and weekly schedule</b>        | <p>Thanks of low power LSI, we nowadays enjoy ITC society with electronics appliances such as cell phones, electric cars and so on. The purpose of this lecture is to understand not only fundamentals of VLSI circuits, but low power circuit technologies which have made this ICT society into reality.</p> <p>Outline of Class and Contents</p> <ol style="list-style-type: none"> <li>1) Introduction to rolls of VLS I on ICT society</li> <li>2) Structure of MOSFET and its characteristics</li> <li>3) Moore's law and Scaling law</li> <li>4) Fundamentals of CMOS LSI circuits</li> <li>5) Power on CMOS LSI</li> <li>6) Low power digital circuit design techniques</li> <li>7) Low power CPU design techniques</li> <li>8) Practice of Circuit Simulation</li> </ol> <p>Interim and final exam will be done during the course.</p> |
| <b>Preparation and review outside class</b>      | Investigation by web is recommended before the lectures.  |
| <b>Evaluation and grading</b>                    | <p>Final exams will be done for evaluation.</p> <p>Evaluation category (Score) are shown as bellow</p> <p>A(<math>\geq 80</math>), B(<math>\geq 70</math>), C(<math>\geq 60</math>), and D(<math>&lt; 60</math>)</p>  |
| <b>Office hours</b>                              | Send e-mail before going to the room of Ishibashi (W2-306)  |
| <b>Message for students</b>                      | This class is focusing on not only low power circuit design but overview and fundamentals of VLSI technology . This class could make you access to semiconductor industry which is nowadays a kind of infrastructures.  |
| <b>Others</b>                                    | The class is held in English. Contents of class are based on lectures held in foreign universities done by Prof. Ishibashi as guest professors.   |
| <b>Keyword(s)</b>                                | VLSI, Low power, Circuit design   |

# Advanced Communication Engineering and Informatics II (Optical Communication Engineering)

## General Information

|                                |  |                                    |  |
|--------------------------------|--|------------------------------------|--|
| <b>Course title (Japanese)</b> | Advanced Communication Engineering and Informatics II (Optical Communication Engineering) (学部) |                                    |  |
| <b>Course title (English)</b>  | Advanced Communication Engineering and Informatics II (Optical Communication Engineering)      |                                    |  |
| <b>Academic year</b>           | 2018   | <b>Year offered</b>                | 4                                      |
| <b>Semester(s) offered</b>     | Spring semester  | <b>Faculty offering the course</b> | Faculty of Informatics and Engineering |
| <b>Teaching method</b>         | Lecture  | <b>Credits</b>                     | 2                                      |
| <b>Category</b>                | Core subjects  |                                    |  |
| <b>Cluster/Department</b>      | Department of Communication Engineering and Informatics  |                                    |  |
| <b>Lecturer(s)</b>             | KISHI Naoto (來住 直人)  |                                    |  |
| <b>Office</b>                  | East 3-1027  |                                    |  |
| <b>e-mail</b>                  | kishi@ice.uec.ac.jp  |                                    |  |
| <b>Course website</b>          | <a href="http://www.opt.cei.uec.ac.jp/optc/">http://www.opt.cei.uec.ac.jp/optc/</a>            |                                    |  |
| <b>Last updated</b>            | 2018/02/23 14:08:27  | <b>Update status</b>               | Released                               |

## Course Description

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| <b>Topic and goals</b>                           | The main subject of this course is "Optical Communication". Optical communication is one of the key technologies for the contemporary information society. The history is still young, just about 30 years after being practically used, but it is developing rapidly nowadays, the communication ability is extremely outstanding and which is a communication technology that will be used in all parts of the society in the future. The goal of the course is to learn the fundamental principle and technical element of communication system, as well as introduce you to some of the latest communication technologies.  |
| <b>Prerequisites</b>                             | Physics Introduction (wave and light), Electromagnetism related subjects, Electrical circuit  |
| <b>Recommended prerequisites and preparation</b> | Knowledge of Fourier analysis, Fourier and concept of time- and frequency-domain  |
| <b>Course textbooks and materials</b>            | No textbooks needed. All course materials will be provided on-line via the URL listed above. (Password is required to access from off-campus)   |
| <b>Course outline and weekly schedule</b>        | <p>The content is as follows,.</p> <ol style="list-style-type: none"> <li>1. Introduction to optical fiber communication.</li> <li>2. Characteristic of light transmission medium of the optical communication and the difference with the low frequency electromagnetic wave.</li> <li>3. Structure of the optical fiber transmission channel and a principle of optical waveguide.</li> <li>4. Important characteristic of the optical fiber, i.e. the linear and non-linear characteristics and the relations with the signal transmission characteristics.</li> <li>5. Principle of basic optical signal source, i.e. photo-generation principle.</li> <li>6. Semiconductor laser light signal source, the light emitting diode structure characteristic and application.</li> <li>7. Single frequency or a multi-wavelength source and pulse light source that specialized in optical communication.</li> <li>8. Theory of optical amplifier in a long-distance optical communication system.</li> <li>9. Characteristic of various optical amplifiers.</li> <li>10. Light elements required in an optical communication system.</li> <li>11. Encoding of the digital light signal, the quality evaluation system of the signal reception.</li> <li>12. The forms of the optical communication system.</li> <li>13. Characteristic and the development of the optical communication system.</li> </ol> |

|   |   |
|---|---|
|   | 14. End uses optical fiber communication system.<br>15. Optical fiber sensor, light and optical fiber measurements.   |
| <b>Preparation and review outside class</b> | Students are required to review (by accessing to the on-line material and other texts).   |
| <b>Evaluation and grading</b>               | Submission of a report will be required at the end of the term. Assessment of this course (pass) will be made over the report at a minimum of 60%.  |
| <b>Office hours</b>                         | Wed (12:30 to 14:30) or after class.  |
| <b>Message for students</b>                 | Optical communications play a vital role and came to be indispensable for a nowadays information and communication network. Gained knowledge of the technology and the principle, will come in useful for all aspects in information and communication fields.  |
| <b>Others</b>                               | For regular students:<br>1) "Department of Communication Engineering" and "Department of Engineering Science" students are not permitted to select the course (there is a Optical communication engineering course offered in the 3rd year).<br>2) Double enroll in Optical communication engineering course is not pemitted. |
| <b>Keyword(s)</b>                           | Telecommunications opticalfibers, dispersion properties, non-linear intensity modulation, direct detection, opticalrepeater, wavelength division multiplexing, laser diode, photo diode, opticalamplifiers, optical network, opticalfiber sensor.   |

# Advanced Engineering Science I (Modern Optics and Photonics)

## General Information

|                                |   |                                    |  |
|--------------------------------|---|------------------------------------|--|
| <b>Course title (Japanese)</b> | Modern Optics and Photonics (学部)  |                                    |  |
| <b>Course title (English)</b>  | Advanced Engineering Science I (Modern Optics and Photonics)                                |                                    |  |
| <b>Academic year</b>           | 2018  | <b>Year offered</b>                | 3/4                                    |
| <b>Semester(s) offered</b>     | Spring semester   | <b>Faculty offering the course</b> | Faculty of Informatics and Engineering |
| <b>Teaching method</b>         | Lecture   | <b>Credits</b>                     | 2                                      |
| <b>Category</b>                | Core subjects   |                                    |  |
| <b>Cluster/Department</b>      | Department of Engineering Science   |                                    |  |
| <b>Lecturer(s)</b>             | TOMITA Yasuo (富田 康生)  |                                    |  |
| <b>Office</b>                  | 205 West 1  |                                    |  |
| <b>e-mail</b>                  | ytomita@uec.ac.jp   |                                    |  |
| <b>Course website</b>          | <a href="http://talbot.es.uec.ac.jp/optics.html">http://talbot.es.uec.ac.jp/optics.html</a> |                                    |  |
| <b>Last updated</b>            | 2018/02/27 13:42:56   | <b>Update status</b>               | Released                               |

## Course Description

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| <b>Topic and goals</b>                           | This is an introductory-level course in the ever-increasing field of modern optics. It includes ray- and wave-descriptions of light propagation and image formation with coherent light. An introduction to holography and optical information processing is also given as an example of parallel and multi-dimensional data handling capabilities of light. Furthermore, it contains discussions of photonic devices (such as lasers, amplifiers, light modulators and detectors) and fiber-optic communications systems. |
| <b>Prerequisites</b>                             | A good understanding of introductory electromagnetics and linear systems theory may be helpful.  |
| <b>Recommended prerequisites and preparation</b> | A good understanding of introductory electromagnetics and linear systems theory may be helpful.  |
| <b>Course textbooks and materials</b>            | F. Graham Smith and Terry A. King, Optics and Photonics, Wiley, New York, 2000<br>E. Hecht, Optics, 4th ed., Addison-Wesley, New York, 2001  |
| <b>Course outline and weekly schedule</b>        | Topics in 90-minute lectures will include:<br>1. Preliminaries (Concept of waves and their mathematical expressions)<br>2. Wave optics<br>3. Fourier optics<br>4. Electromagnetic and crystal optics<br>5. Guided-wave and fiber optics<br>6. Introduction to fiber-optic communications   |
| <b>Preparation and review outside class</b>      | Reading textbooks and solving homework problem sets  |
| <b>Evaluation and grading</b>                    | The grades will be based 20% on the homework, 30% on the mid-term exam and 50% on the final exam.  |
| <b>Office hours</b>                              | Monday 16:00-17:00   |
| <b>Message for students</b>                      | It is very interesting to learn the ever-increasing field of photonics through this lecture. The knowledge of photonics is very useful to grasp operational principles of many devices and systems around us. These include DVD, laser pointers, fiber optic communication systems etc.  |
| <b>Others</b>                                    | Photonics is the technology of using waves and photons!  |
| <b>Keyword(s)</b>                                | Wave optics, Diffraction, Interference, Electromagnetic wave, Maxwell equations, Wave polarization, Crystals, Guided-wave and fiber optics   |

# Introduction to Computational Methods in Science and Engineering

## General Information

|                                |   |                                    |                                       |
|--------------------------------|---|------------------------------------|---------------------------------------|
| <b>Course title (Japanese)</b> | Introduction to Computational Methods in Science and Engineering            |                                    |                                       |
| <b>Course title (English)</b>  | Introduction to Computational Methods in Science and Engineering            |                                    |                                       |
| <b>Academic year</b>           | 2018  | <b>Year offered</b>                | 3/4                                   |
| <b>Semester(s) offered</b>     | Spring semester   | <b>Faculty offering the course</b> | School of Informatics and Engineering |
| <b>Teaching method</b>         | Lecture   | <b>Credits</b>                     | 2                                     |
| <b>Category</b>                | General culture subjects  |                                    |                                       |
| <b>Cluster/Department</b>      | School of Informatics and Engineering                                       |                                    |                                       |
| <b>Lecturer(s)</b>             | Hans-Georg Matuttis   |                                    |                                       |
| <b>Office</b>                  | E4-721  |                                    |                                       |
| <b>e-mail</b>                  | hg@mce.uec.ac.jp  |                                    |                                       |
| <b>Course website</b>          | <a href="http://webclass.cdel.uec.ac.jp">http://webclass.cdel.uec.ac.jp</a> |                                    |                                       |
| <b>Last updated</b>            | 2018/03/06 12:37:08   | <b>Update status</b>               | Released                              |

## Course Description

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| <b>Topic and goals</b>                           | Computational methods have replaced analytical methods already in many fields of science and engineering, and their importance is still increasing. The aim of the lecture is to provide fundamental criteria for the choice of numerical methods, give an overview about some available methods in some fields, and give ideas about performance-oriented implementation for such methods. Depending on the background and interest of the auditory, some subjects can be changed.  |
| <b>Prerequisites</b>                             | First year Analysis and Linear Algebra, one procedural Programming Language  |
| <b>Recommended prerequisites and preparation</b> | NIL  |
| <b>Course textbooks and materials</b>            | Scriptum can be downloaded from <a href="http://webclass.cdel.uec.ac.jp/">http://webclass.cdel.uec.ac.jp/</a> , further reading:<br>A. L. Garcia, Numerical Methods for Physics, Benjamin-Cummings Pub Co, 1999<br>G.J. Borse: Numerical Methods with Matlab, International Thomson Publishing, 1997   |
| <b>Course outline and weekly schedule</b>        | <ol style="list-style-type: none"> <li>1. Simple MATLAB-Syntax</li> <li>2. How to write better programs</li> <li>3. Non-numerical methods: Monte-Carlo techniques</li> <li>4. Representation of Numbers</li> <li>5. Elementary numerical analysis I: What are numerical errors</li> <li>6. Elementary numerical analysis II: How to get "correct" results from calculations "with error"</li> <li>8. MATLAB Graphics</li> <li>9. Introduction to numerical Linear algebra I: Repetition 1st year Linear Algebra</li> <li>10. Introduction to numerical Linear algebra II: How to draw a line through more than 2 points (or maybe not)</li> <li>11. Introduction to numerical Linear algebra III: Least squared fitting</li> <li>12. Polynomials and Roots</li> <li>13. Solving ordinary differential equations I: Basics<br/>Initial conditions, analytic solutions, Euler Method</li> <li>14. Solving ordinary differential equations II: Higher order Methods<br/>Approaches to construct higher order methods, Runge-Kutta methods</li> <li>15. Solving ordinary differential equations III: Advanced methods<br/>Adaptive Timesteps, energy conservation systems, stiff problems</li> </ol> |
| <b>Preparation and review outside class</b>      | NIL  |



|                               |  |
|-------------------------------|--|
| <b>Evaluation and grading</b> | Participation in the Lecture and Homework in the E-Learning System<br>Depending on the activity level of the students, Mid-Term and End-Term exams will be held. |
| <b>Office hours</b>           | Friday, second slot, in East-4, Room 721, but if you contact me by E-Mail, other times are possible.   |
| <b>Message for students</b>   | Lecture starts after the the introduction to the computer system in the Jusst-Program has been held.   |
| <b>Others</b>                 | Lecture starts after the the introduction to the computer system in the Jusst-Program has been held.   |
| <b>Keyword(s)</b>             | Numerical Analysis, Scientific Programming   |

# Advanced Theory of Systems Reliability

## General Information

|                                |   |                                    |                                    |
|--------------------------------|---|------------------------------------|------------------------------------|
| <b>Course title (Japanese)</b> | システム信頼性特論   |                                    |                                    |
| <b>Course title (English)</b>  | Advanced Theory of Systems Reliability                                |                                    |                                    |
| <b>Academic year</b>           | 2018  | <b>Year offered</b>                | All                                |
| <b>Semester(s) offered</b>     | Spring semester   | <b>Faculty offering the course</b> | Master's Program, Doctoral Program |
| <b>Teaching method</b>         | Lecture   | <b>Credits</b>                     | 2                                  |
| <b>Category</b>                | Graduate school core education subjects - Core development subjects   |                                    |                                    |
| <b>Cluster/Department</b>      | Department of Informatics   |                                    |                                    |
| <b>Lecturer(s)</b>             | JIN Lu (金 路)  |                                    |                                    |
| <b>Office</b>                  | West 5-607 (JIN)  |                                    |                                    |
| <b>e-mail</b>                  | jinlu@inf.uec.ac.jp   |                                    |                                    |
| <b>Course website</b>          | <a href="http://www.rm.inf.uec.ac.jp">http://www.rm.inf.uec.ac.jp</a> |                                    |                                    |
| <b>Last updated</b>            | 2018/02/27 18:02:13   | <b>Update status</b>               | Released                           |

## Course Description

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| <b>Topic and goals</b>                           | This lecture deals with Reliability Engineering and its theory which focus on the philosophy, ideas and scientific methods to build n quality and reliability into systems. Also, recent development of information technology has been changing the methods of Reliability Engineering. These new aspects are also dealt with.  |
| <b>Prerequisites</b>                             | None   |
| <b>Recommended prerequisites and preparation</b> | It would be helpful if the students have a background of probability and statistic.  |
| <b>Course textbooks and materials</b>            | No textbooks, just original handout  |
| <b>Course outline and weekly schedule</b>        | <p>Each class will be conducted by using handouts and powerpoints, no textbook needed. Reliability engineering and reliability theory, design, reliability tests, mathematical learning in data analysis, especially the theory of probability and statistics are much applied. It is also aims to learn the applied mathematics sophistication by learning those knowledge mentioned above. Classes are carried out in English.</p> <p>The lesson will be mainly described the theories and ideas. 3 to 4 drills will be carried out during the class period and a chance for reviewing the course contents will be provided.</p> <p>#1: Introduction: Quality Control and Reliability Engineering in Japan<br/> #2: Principal Models of Reliability<br/> #3: Advanced Models of Reliability<br/> #4: System Reliability Design(1)<br/> #5: System Reliability Design(2)<br/> #6: Reliability Testing and Fault Analysis<br/> #7: Reliability Data Analysis (1) Models for Accelerated Life Testing<br/> #8: Reliability Data Analysis (2) Hazard Rate Model<br/> #9: Preventive Maintenance and Inspection<br/> #10: Model and Theory for Maintenance(1) Decision-making and Optimal Maintenance Policy<br/> #11: Model and Theory for Maintenance(2) On-line Condition Monitoring<br/> #12: Prediction and Prevention of Failures<br/> #13: Quality and Reliability Assurance(1)FMEA<br/> #14: Quality and Reliability Assurance(2)FTA<br/> #15: Quality and Reliability Assurance(3)Group Discussion</p> |
| <b>Preparation and review outside class</b>      | None   |
| <b>Evaluation and grading</b>                    | Assessment will be based on the level of understanding   |
| <b>Office hours</b>                              | After the class  |

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| <b>Message for students</b> | There are also many foreign student in this class. So it is also a good change to make foreign friends. I will prepare the handout in both English and Japanese, furthermore, the important part will be explained in both languages, so the students do not need to worry about their English. |
| <b>Others</b>               | This lecture will be given in English.  |
| <b>Keyword(s)</b>           | Reliability, Quality Control, Maintenance   |

# Topics in Informatics II (Sustainable Supply Chain Management)

## General Information

|                                |   |                                    |                                       |
|--------------------------------|---|------------------------------------|---------------------------------------|
| <b>Course title (Japanese)</b> | Topics in Informatics II (Sustainable Supply Chain Management) (学域)                             |                                    |                                       |
| <b>Course title (English)</b>  | Topics in Informatics II  |                                    |                                       |
| <b>Academic year</b>           | 2018  | <b>Year offered</b>                | 2/3/4                                 |
| <b>Semester(s) offered</b>     | Spring semester   | <b>Faculty offering the course</b> | School of Informatics and Engineering |
| <b>Teaching method</b>         | Lecture   | <b>Credits</b>                     | 2                                     |
| <b>Category</b>                | Core subjects   |                                    |                                       |
| <b>Cluster/Department</b>      | I/II  |                                    |                                       |
| <b>Lecturer(s)</b>             | YAMADA Tetsuo (山田 哲男)   |                                    |                                       |
| <b>Office</b>                  | Room #507 in Building West 5  |                                    |                                       |
| <b>e-mail</b>                  | tyamada@uec.ac.jp   |                                    |                                       |
| <b>Course website</b>          | <a href="http://webclass.cdel.uec.ac.jp/webclass/">http://webclass.cdel.uec.ac.jp/webclass/</a> |                                    |                                       |
| <b>Last updated</b>            | 2018/03/16 10:00:36   | <b>Update status</b>               | Released                              |

## Course Description

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| <b>Topic and goals</b>                           | Supply Chain is that product and information flows among suppliers, factories, distribution centers and markets by manufacturing and logistics. This supply chain is now globally networked consisting of not only domestic but also overseas suppliers, factories and markets. Therefore, the global supply chain management is required to pursue higher profit for companies. On the other hand, the environmental issues such as global warming and material starvation have been more serious because manufacturing and logistics inevitably consume natural resources for materials and energy and emitted Greenhouse Gases (GHG) including CO <sub>2</sub> throughout their product lifecycle and supply chain. In order to not to become more serious for the environmental issues, it is necessary for the supply chain to minimize the material and energy consumptions during the whole product lifecycle economically. This course gives variety topics in supply chain management and sustainability, and acquire how to harmonize the supply chain and sustainability simultaneously. |
| <b>Prerequisites</b>                             | None  |
| <b>Recommended prerequisites and preparation</b> | Production Management, Operations Research, Introduction to Operations Research   |
| <b>Course textbooks and materials</b>            | No textbook, Handouts will be used as a guide for the class.  |
| <b>Course outline and weekly schedule</b>        | #1 Guidance<br>#2 Supply Chain<br>#3 Supply Chain Management<br>#4 Supply Chain Network<br>#5 Global Supply Chain<br>#6 Assembly Line System<br>#7 Scheduling<br>#8 Sustainable Manufacturing<br>#9 Low-carbon Supply Chain<br>#10 Life Cycle Assessment<br>#11 Carbon Tax<br>#12 Closed-loop Supply Chain<br>#13 Disassembly, Reuse and Recycling<br>#14 Sustainable Product Design<br>#15 Summary   |
| <b>Preparation and review outside class</b>      | Several assignments will be conducted.  |
| <b>Evaluation and grading</b>                    | Evaluation: Presentations (30%), Activities (40%) and Assignments (30%)   |
| <b>Office hours</b>                              | Mondays at the 4th class. Make an appointment by e-mail in advance.   |

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| <b>Message for students</b> | Let's discuss how to harmonize supply chain and sustainability and enjoy it!   |
| <b>Others</b>               | No assignment, No success. This course is taught in English, and Japanese is also added as the need arises.  |
| <b>Keyword(s)</b>           | Global Supply Chain, Sustainable Manufacturing, Reuse and Recycling, Low-carbon and Closed-loop Supply Chain, Sustainable Product Design, Assembly/Disassembly, Scheduling |

# Advanced Engineering Science II (Photonics and Opto-electronics)

## General Information

|                                |   |                                    |  |
|--------------------------------|---|------------------------------------|--|
| <b>Course title (Japanese)</b> | Photonics and opto-electronics (学部)   |                                    |  |
| <b>Course title (English)</b>  | Advanced Engineering Science II (Photonics and Opto-electronics)  |                                    |  |
| <b>Academic year</b>           | 2018  | <b>Year offered</b>                | 3/4                                    |
| <b>Semester(s) offered</b>     | Spring semester   | <b>Faculty offering the course</b> | Faculty of Informatics and Engineering |
| <b>Teaching method</b>         | Lecture   | <b>Credits</b>                     | 2                                      |
| <b>Category</b>                | Core subjects   |                                    |  |
| <b>Cluster/Department</b>      | Department of Engineering Science   |                                    |  |
| <b>Lecturer(s)</b>             | UENO Yoshiyasu (上野 芳康)  |                                    |  |
| <b>Office</b>                  | Room no. 313, Building no. West-2 (W2-313).   |                                    |  |
| <b>e-mail</b>                  | uenoy@ultrafast.ee.uec.ac.jp  |                                    |  |
| <b>Course website</b>          | <a href="http://www.ultrafast.ee.uec.ac.jp/ueno-classes.html">http://www.ultrafast.ee.uec.ac.jp/ueno-classes.html</a> |                                    |  |
| <b>Last updated</b>            | 2018/03/14 22:28:24   | <b>Update status</b>               | Released                               |

## Course Description

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| <b>Topic and goals</b>                           | Modern photonics and electronics have been deeply spread to both academy and industry of our Real World, without country borders. It is because photonics and opto-electronics have realized terabit-per-second network infrastructures, optical-disk memories (DVD&CD's), compact and accurate laser diodes (from infrared to blue), and flat displays, in industry uses and home uses. In these science and technology, particle-based photonic properties of representative materials are almost always fully combined with their wave-based optical properties, in "bright" manners. In this course, typically 15 weeks, participants are expected to study and understand the scientific fundamentals of these photonic technology, and also to develop interests to on-going, long-term (i.e. large-scale) R&D activities in our world.   |
| <b>Prerequisites</b>                             | fundamentals of electro-magnetic waves (propagating in speed of light).<br>fundamentals of electronics such as basic diodes and transistors.  |
| <b>Recommended prerequisites and preparation</b> | fundamentals of quantum mechanics (particles and waves).<br>fundamentals of crystalline materials and their basic, electronic properties.   |
| <b>Course textbooks and materials</b>            | 1) Saleh and Teich, Fundamentals of Photonics, 2nd edition, Wiley, 2007.<br>2) Amnon Yariv and Pochi Yeh, Photonics: Optical Electronics in Modern Communications, 6th edition, Oxford, 2006.   |
| <b>Course outline and weekly schedule</b>        | <p>1st-5th weeks:</p> <p>(1) Areas of science and technology where photonics and opto-electronics play particularly important roles in our world.</p> <p>(2) Representative photonic devices and materials that many of us must use and rely on, in these areas of science and technology.</p> <p>(3) Fundamental properties of silicon and other few important types of semiconductor crystals. Basics of direct transition (for light-emitting diodes and lasers), in contrast to indirect transition (for sensors and solar cells, for example).</p> <p>Then, basics of quantum-particle-based properties such as conservation laws in unit of electron-volts, in contrast to quantum-wave-based properties. (All of these are well understood and designed in all LED's, laser diodes, optical sensors, solar cells, for example.)</p> <p>6th-10th weeks:</p> <p>(4) General relationship from electrons to electron waves. That from lightwaves (em waves) to photons.</p> <p>(5) Device's internal structures (of light-emitting diodes and light-absorbing sensors), and their working principles.</p> <p>(6) Energy conversion law and general limits in energy-conversion efficiency, from electronic energy to photonic energy. That in the opposite direction, that is, from photonic energy to electronic energy.</p> |

|   |   |
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|   | <p>11th-15th weeks:</p> <p>(7) advanced groups of lasers, consisting of cavities and waveguides, which are deeply and broadly used in advanced systems such as network infrastructures (terabit per second), optical-disk memories (DVD&amp;CD's), compact and accurate laser diodes (from infrared to blue).</p> <p>(8) high-density light energy in time and 3D-space dimensions (total four dimensions), that is rather simply generated by laser oscillators in particular. (Several kinds of experimental research are going on in our UEC campus, as well.)</p> |
| <b>Preparation and review outside class</b> | Both personal and group studies, efficiently before and after each weekly classroom, are encouraged.  |
| <b>Evaluation and grading</b>               | Understanding level of each student is evaluated, in the final test in the end of the 15-week course.   |
| <b>Office hours</b>                         | 6th period, Tuesdays. (Notify me Ueno by email, when I was not available in the period of tuesday.)   |
| <b>Message for students</b>                 | The number of participants to this course will be around 10, too, and, could be slightly less. So, this lecturer Ueno welcomes questions from participants sometimes in the middle of 90 minutes, rather than after it. Your asking good questions to lecturer inspires the other participants, too, basically.   |
| <b>Others</b>                               | Lecturer Ueno's international activities:<br><a href="http://www.ultrafast.ee.uec.ac.jp/ueno-cv.html">http://www.ultrafast.ee.uec.ac.jp/ueno-cv.html</a>  |
| <b>Keyword(s)</b>                           | photonics, opto-electronics, quantum mechanics, electro-magnetic waves, light-emitting diodes (spontaneous emission), lasers (stimulated emission), optical sensors, solar batteries, silicon, gallium arsenide, semiconductor.   |

# Advanced Communication Engineering and Informatics I (Information and Communication Networks)

## General Information

|                                |  |                                    |                  |
|--------------------------------|--|------------------------------------|------------------|
| <b>Course title (Japanese)</b> | 情報通信ネットワーク   |                                    |                  |
| <b>Course title (English)</b>  | Advanced Communication Engineering and Informatics I<br>(Information and Communication Networks) |                                    |                  |
| <b>Academic year</b>           | 2018   | <b>Year offered</b>                | All              |
| <b>Semester(s) offered</b>     | Spring semester  | <b>Faculty offering the course</b> | Master's Program |
| <b>Teaching method</b>         | Lecture  | <b>Credits</b>                     | 2                |
| <b>Category</b>                | Graduate school core education subjects (Collaborative core subjects)                            |                                    |                  |
| <b>Cluster/Department</b>      | Department of Communication Engineering and Informatics  |                                    |                  |
| <b>Lecturer(s)</b>             | OKI Eiji (大木 英司)   |                                    |                  |
| <b>Office</b>                  |  |                                    |                  |
| <b>e-mail</b>                  | oki@i.kyoto-u.ac.jp  |                                    |                  |
| <b>Course website</b>          | <a href="http://oki.ice.uec.ac.jp/">http://oki.ice.uec.ac.jp/</a>                                |                                    |                  |
| <b>Last updated</b>            | 2018/02/21 9:56:04   | <b>Update status</b>               | Released         |

## Course Description

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| <b>Topic and goals</b>                           | Communication networks serve as the most important infrastructure for the today's information society. This course deals with mathematical programming and algorithms for communication networks. The course objectives are to understand the fundamental concepts communication networks and theories for network designs and controls, and bridge the gap between the theories and practices.   |
| <b>Prerequisites</b>                             | The minimum requirement to understand this course is a knowledge of linear algebra and computer logic.  |
| <b>Recommended prerequisites and preparation</b> | Undergraduate courses related to information, communications, networks, probability and statistics, and mathematical programming.   |
| <b>Course textbooks and materials</b>            | Book 1: E. Oki, Linear Programming and Algorithms for Communication Networks, CRC Press, Boca Raton, 2012.<br>Book 2: Book 1の日本語版, 大木英司, 通信ネットワークのための数理計画法, コロナ社, 2012.<br><br>The contents of this course are almost covered by Book 1.  |
| <b>Course outline and weekly schedule</b>        | The subjects include the following items. The topics may be subject to change due to the progress.<br><br>1. Introduction and Basic problems for communication networks<br>2. Algorithms for basic problems (Shortest path routing max flow problem)<br>3. Algorithms for basic problems (Minimum-cost flow problem)<br>4. Disjoint path routing<br>5. Liner programming basics<br>6. Application of liner programming<br>7. Mid-term exercise/examination<br>8. GLPK (GNU Liner Programming Kit)<br>9. Basic problems solved by LP<br>10. Disjoint path routing and wavelength assignment solved by LP<br>11. Routing and traffic demand model (basics)<br>12. Routing and traffic demand model (hose models and others)<br>13. Mathematical puzzles<br>14. Advanced mathematical puzzles<br>15. Advanced topics |



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| <b>Preparation and review outside class</b> | As preparation, read the corresponding chapter of the textbook.   |
| <b>Evaluation and grading</b>               | Methods:<br>Homework, and mid-term and final examinations<br>Criteria:<br>Fundamentals and theories (50%)<br>Practices (50%)  |
| <b>Office hours</b>                         | After lecture. Others make an appointment by email.   |
| <b>Message for students</b>                 | The students are required to study the textbook to understand the contents of this course.<br>Lecture will be given mainly in English. Both Japanese and English is allowable for question. |
| <b>Others</b>                               | NIL   |
| <b>Keyword(s)</b>                           | Information and communication, communication network, design and control, mathematical programming, algorithm   |