2013 (Term I ~ II)
SCHOOL SPECIFIC COURSE
SYLLABUS FOR G30 PROGRAM
(School of Agricultural Sciences)
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# Mathematics Tutorial I

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<td>I (1st year, Fall semester) / Tue / 4 (14:45 - 16:15)</td>
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<tr>
<td><strong>Instructor</strong></td>
<td>Anne-Katrin Herbig and Serge Charles Richard</td>
</tr>
<tr>
<td><strong>Contact</strong></td>
<td><a href="mailto:herbig@math.nagoya-u.ac.jp">herbig@math.nagoya-u.ac.jp</a></td>
</tr>
<tr>
<td></td>
<td><a href="mailto:Richard@math.nagoya-u.ac.jp">Richard@math.nagoya-u.ac.jp</a></td>
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</table>

## Course Purpose
The aim of this course is to deepen the understanding of mathematics (calculus and linear algebra) and to cultivate the ability to apply mathematical knowledge. And this course connects high school mathematics and university mathematics.

## Course Contents
1. Limits and continuity
2. Single variable differentiations
3. Single variable integration
4. Basic analytic geometry
5. Matrices
6. Gaussian elimination
7. Determinants

## Grading
Grades will be determined based on four assessed courseworks, each of them marked out of 25. The grading scale will be S: 90-100, A: 80-89, B: 70-79, C: 60-69, F: 0-59.

## Course Withdrawal
To withdraw from the course and obtain the grade Absent, a written Course Withdrawal Request must be submitted before the end of May.

## Prerequisite
Calculus I and Linear Algebra I.

## Related Courses
Calculus II and Linear Algebra II.

## Text Book
James Stewart

Otto Bretscher

## Remarks
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<td><strong>Coordinator</strong></td>
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</tbody>
</table>
| **Contact** | Office: Science Hall 5F 517  
Phone: 052-789-2307  
Email: john.wojdylo@s.phys.nagoya-u.ac.jp |

**Course Purpose**
This is a companion course to Fundamental Physics I and Fundamental Physics II, and offers practical exercises for mastering the concepts introduced in the lecture courses. Students taking the lecture courses should also take this tutorial class.

**Course Contents**
See syllabi for Fundamental Physics I, Fundamental Physics II.

**Grading**
Weekly assignments; attendance; class participation. (Weighting to be advised.)

**Course Withdrawal**
Criteria for “Absent” & “Fail” Grades
- Class attendance is required. Absentees must give a valid reason (e.g. doctor’s certificate). A student who is absent from more than 3 sessions will receive zero for the semester attendance mark.
- The “Absent” grade is reserved for students who withdraw by November 16. After that day, a letter grade will be awarded based on marks earned from all assessment during the semester.

**Prerequisites**
None.

**Text Book**

**Related Courses**
Calculus I; Fundamental Physics I; Fundamentals of Physics II

**Remarks**
- No pre-requisite is required; however, students without a good background in high school physics and basic calculus are expected to spend more time on this course, and are advised to take this into consideration when deciding their course load.
- Concurrent registration for Fundamental Physics I and Fundamental Physics II is required.
- Students are expected to participate actively in class activities throughout the course.
### Course Purpose
The aim of this course is to deepen the understanding of mathematics (calculus and linear algebra) and to cultivate the ability to apply mathematical knowledge.

### Course Contents
We will present problems and their solutions based on the material that is presented in the courses Calculus II and Linear Algebra II covering the following topics:
1. Limits and continuity of multivariable functions
2. Differentiability of multivariable functions
3. Integration of multivariable functions
4. Vector spaces
5. Linear maps
6. Eigenvectors and eigenvalues

### Grading
Grades will be determined based on four assessed courseworks, each of them marked out of 25. The grading scale will be S: 90-100, A: 80-89, B: 70-79, C: 60-69, F: 0-59.

### Course Withdrawal
To withdraw from the course and obtain the grade Absent, a written Course Withdrawal Request must be submitted before the end of May.

### Related Courses
Calculus II and Linear Algebra II.
Course Type: Basic Specialized Courses

Course Purpose:
The aims of this course are to deepen students' understanding of basic Physics of electricity and magnetism and to cultivate their ability to apply Physics knowledge.

Prerequisite Subjects:
- Fundamentals of Physics

Course Topics:
1. Electric Charge and Electric Fields
2. Gauss' Law
3. Electric Potential
4. Capacitance, Current, Resistance and Circuits
5. Magnetic Fields
6. Induction and Inductance

Textbook:
Fundamentals of Physics
David Halliday, Robert Resnick, Jearl Walker
John Wiley & Sons Inc

Additional Reading:

Grade Assessment:
Class attendance is required. Absentee must give a valid reason. Class Attendance: 20%; Tutorial Assignments & Quizzes: 60%; Participation: 20%.

Notes:

Contacting Faculty:

Class Format Exercise
Course Name: Chemistry Fundamental and Applied Physics
Automotive Engineering
Starts: 1 Spring Semester 1 Spring Semester 1 Spring Semester 1 Spring Semester
Elective/Compulsory: Elective/Compulsory
Lecturer: Bernard Gelloz
Designated Professor

Registration code: 0910820
Course Type: Basic Specialized Courses

Course Purpose:
The aims of this course are to deepen students' understanding of basic Physics of electricity, magnetism, waves, and optics, and to cultivate their ability to apply Physics knowledge.

Prerequisite Subjects:
Fundamentals of Physics

Course Topics:
1. Electromagnetic Oscillations and Alternating Current
2. Maxwell's Equations
3. Waves
4. Electromagnetic Waves
5. Images
6. Interference & Diffraction

Textbook:
Fundamentals of Physics
David Halliday, Robert Resnick, Jearl Walker
John Wiley & Sons Inc

Additional Reading:

Grade Assessment:
Class attendance is required. Absentee must give a valid reason.
Class Attendance: 20%;
Tutorial Assignments & Quizzes: 60%;
Participation: 20%.

Notes:

Contacting Faculty:

Class Format: Exercise
Course Name: Fundamentals of Physics Tutorial II b (1.0 credits)
Registration code: 0910821
2013 (Term III~IV)

SCHOOL SPECIFIC COURSE SYLLABUS FOR G30 PROGRAM

(School of Agricultural Sciences)
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# Biochemistry I

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<tr>
<td>Instructor</td>
<td>MIZUKAMI, Yukiko</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Contact</td>
<td>Office: Science &amp; Agriculture Building, Room 333 (SA333) Phone: (052-789-) 2967 E-mail: <a href="mailto:ymizukami@bio.nagoya-u.ac.jp">ymizukami@bio.nagoya-u.ac.jp</a></td>
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## Course Purpose
This course provides students with a comprehensive introduction to the chemical evolution of biomolecules and their contributions to life. Topics discussed include the origin of life; chemical and physical properties of water; chemical, structural, and functional properties of nucleotides, nucleic acids, amino acids, and proteins.

## Course Contents

### PART I: INTRODUCTION
1. Life, Cells and Thermodynamics (1): The origin of Life.
2. Life, Cells and Thermodynamics (2): Cellular architecture; Thermodynamics.

### Part II: BIOMOLECULES
5. DNA Structure, Function, and Engineering (2): Nucleic acid sequencing; Manipulating DNA.
6. Amino Acids: Amino acid structure; Stereochemistry; Amino acid derivatives.
7. Proteins: Primary structure (1): Polypeptide diversity; Protein purification and analysis.

## Grading

**Grading materials:** Homework (10%); Attendance and participation (20%); Exams (70%).

**Grading scale:** S=90-100%; A=80-89%; B=70-79%; C=60-69%; F=below 59%.

**Course Withdrawal**
With a written request sent to the instructor before/on October 28 via e-mail, you can cancel a course assignment without it appearing on your record.

**Criteria for “Absent” & “Fail” Grades**
No “Absent” grade will be given in this course. Students who fail to attend 3 or more lectures will immediately get an “F (Fail)” grade.

**Prerequisite**
Fundamentals of Biology I & II (Terms I & II, respectively)

**Related Courses**
Biochemistry II, III, and IV (Terms IV, V, and VI, respectively)

**Textbook**

**Reference Book**
Will be introduced in class

**Remarks**
Office hours: Thursday, 2:00 pm – 4:00 pm, or by an appointment via e-mail
G30 Program (School of Agricultural Sciences), (Undergraduate)

### Physiology I

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**Course Category**  
Specialized Courses

**Class room**  
A-407

**Term (Semester)/Day/Period**  
III (2nd year, Fall semester) / Mon / 3 (13:00 ~ 14:30)

**Instructor**  
MIZUKAMI, Yukiko

**Contact**  
Office: Science & Agriculture Building, Room 333 (SA333)  
Phone: (052-789-) 2967  
E-mail: ymizukami@bio.nagoya-u.ac.jp

**Course Purpose**  
This course outlines the fundamentals of plant physiology, beginning with a brief introduction of general concepts in physiology to clarify the common or distinct aspects of physiological strategies used by animals and plants. Topics discussed in the plant physiology section include physiological principles of plant structure, growth, and development; transport and translocation of water in plants; responses of plant cells to light and other external signals; and strategies for CO2 fixation.

**Course Contents**

**PART I: General Concepts in Physiology**
1. Introduction: What is physiology?  
2. The organization of the body: The principal organ systems in animals and plants  
3. Animal morphogenesis: Embryogenesis and organogenesis in Drosophila

**PART II: Fundamentals of Plant Physiology**
4. Principles of plant life: Embryogenesis and post-embryonic development in plants  
5. Plant structure & function (1): Unique patterns in plants  
6. Plant structure & function (2): Vegetative system  
7. Plant structure & function (3): Reproductive system  
8. Water in plant life: Transport and translocation of water  
9. Light, photoreceptors, and plant growth: External signals and plant growth  
10. Photosynthesis (1) The light reactions  
11. Photosynthesis (2) The carbon reactions

**Grading**

**Grading materials:** Homework (10%); Attendance and participation (20%); Exams (70%).  
**Grading scale:** S=90-100%; A=80-89%; B=70-79%; C=60-69%; F=below 59%.

**Course Withdrawal**
With a written request sent to the instructor before/on **October 28** via e-mail, you can cancel a course assignment without it appearing on your record.

**Criteria for “Absent” & “Fail” Grades**
No “Absent” grade will be given in this course. Students who fail to attend 3 or more lectures will immediately get an “F (Fail)” grade.

**Prerequisite**
Fundamentals of Biology I & II (Terms I & II, respectively)

**Reference Books**

**Remarks**
Office hours: Thursday, 2:00 pm – 4:00 pm, or by an appointment via e-mail
Course Type: Basic

Course Purpose:
Building on the mathematics and physics knowledge gained in Fundamental Major Subjects, this course introduces students to vector analysis and partial differential equations, expecting their applications to advanced engineering, such as those related to mechanics and electromagnetics, and those to materials and heat transfer phenomena. The purpose of the course is to acquire fundamental knowledge in vector analysis and partial differential equations and enable students to apply this to solve actual engineering issues.

Prerequisite Subjects:
Fundamental Major Subjects: physics and mathematics lectures

Course Topics:
1. Orientation of the course
2. Vector algebra
3. Vector differential operations
4. Vector integration
5. Gauss theorem, Green's theorem and Stokes theorem
6. Concept of partial differential equations
7. Modelling: Vibrating String, Wave equation
8. Separation of variables, Use of Fourier series
9. Heat equation: Solution by Fourier series

Textbook:
TBA

Additional Reading:

Grade Assessment:
Attendance: (20%) Lecture exercises: (30%) Examinations: (50%) Students need to obtain at least 60% of the total marks to pass the course.

Contacting Faculty:
Office: Bld. No. 6, Room No. 109, Tel: 052-789-5200, E-mail: s-mutoh@nucl.nagoya-u.ac.jp
Course Type: Basic Specialized Courses

Course Purpose
The purpose of the course is to acquire fundamental knowledge in vector analysis and partial differential equations and enable students to apply this to solve actual engineering issues through intensive exercises, based on...

Prerequisite Subjects
Fundamental Major Subjects: physics and mathematics courses

Course Topics
1. Orientation of the course
2. Vector algebra
3. Vector differential operations
4. Vector integration
5. Gauss theorem, Green's theorem and Stokes theorem
6. Concept of partial differential equations
7. Modelling: Vibrating String, Wave equation
8. Separation of variables, Use of Fourier series
9. Heat equation: Solution by Fourier series

Textbook
TBA

Additional Reading

Grade Assessment
Attendance: (20%) Lecture exercises: (30%) Examinations: (50%) Students need to obtain at least 60% of the total marks to pass the course.

Notes

Contacting Faculty
Office: Bld. No. 6, Room No. 109, Tel: 052-789-5200, E-mail: s-mutoh@nucl.nagoya-u.ac.jp
Course Type: Basic Specialized Courses

Course Purpose:
The main purpose of this course is to acquire a logical framework for understanding fundamental organic chemistry. This framework emphasizes how the structure of organic molecules is related to the molecular functions in chemical reactions. On the basis of the understanding, we consecutively learn how to solve the practical problems in organic chemistry.

Prerequisite Subjects:
Fundamentals of Chemistry I and II

Course Topics:
1. Structure and Bonding in Organic Molecules; Hybridization
2. Structures of Organic Molecules and Stereochemistry
3. Structures and Reactivity
4. Alkanes and Cycloalkanes
5. Alkenes and Alkynes
6. Delocalized pi system
7. Polar and Nonpolar Molecules, Formal Charge and Oxidation States
8. Acids and Base versus Electrophiles and Nucleophiles
9. Chemical Reactions: Bond Dissociation and Formation in Ionic and Radical Reactions
10. Chemical Reactions: Additions, Substitutions, and Eliminations
12. Chemical Kinetics: Stabilities of Reaction Intermediates

Textbook:

Additional Reading:

Grade Assessment:
Examination (50%); Attendance (20%); Homework and Quiz (30%): S(≥90), A(90–80), B(80–70), C(70–60), and F(≤60)

Notes:
1. Course Withdrawal: Students can withdraw the course during a certain period prepared for course-withdrawal by the university.
2. Criteria for "Absent" & "Fail" Grades: A maximum of three absences can be authorized, and student sickness/absence reporting is required.

Contacting Faculty:
Students can communicate with their course instructor face-to-face in the corresponding class or in the appointment time. Communication through the e-mail is also available.

Class Format: Lecture
Course Name: Chemistry
Starts: Autumn Semester
Elective/Compulsory: Compulsory
Lecturer: Jiyoung Shin
Designated Associate Professor
Organic Chemistry I (2.0 credits)
### Analytical Mechanics I

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<th>Contact</th>
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<tbody>
<tr>
<td>Office: ES420</td>
</tr>
<tr>
<td>Phone: 052-789-2861</td>
</tr>
<tr>
<td>Email: <a href="mailto:skfoong@eken.phys.nagoya-u.ac.jp">skfoong@eken.phys.nagoya-u.ac.jp</a></td>
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#### Course Purpose
To gain a deeper understanding of Newtonian mechanics and to introduce and the most important Lagrangian and Hamiltonian formulations. These formulations are then used in the solution of the two-body central force problems. Comparisons will be made between the approaches. This course is a pre-requisite for Analytical Mechanics II.

#### Course Contents
1. Newton’s Laws of Motion
2. Projectiles with air resistance
3. Momentum and Angular Momentum
4. Energy and Forces
5. Oscillations
6. Calculus of Variations
7. Lagrange’s Equations
8. Hamiltonian Mechanics
9. Two Body Central-Force Problems

#### Grading
- Class Participation: 10%
- Assignment: 10%
- Mid-term exam: 30%
- Final Exam: 50%

#### Course Withdrawal
Criteria for “Absent” & “Fail” Grades
Class attendance is required. Absentee must give a valid reason supported with document. A student will receive an “Absent” grade if he is absent from lecture more than 3 times or he is absent without valid reason from the mid-term exam or final exam.

#### Prerequisite
- Calculus I, Calculus II, Fundamentals of Physics I & II

#### Related Courses
- Physics Tutorial Ia, Mathematical Physics I & II, Analytical Mechanics II, Quantum Mechanics I & II

#### Text Book

#### Reference Book
- These reference books are available in the Main Library
  4. H. Goldstein, Poole & Safko, Classical Mechanics (Addison Wesley, 2002)

#### Remarks
You are strongly encouraged to register for Physics Tutorial Ia which is the tutorial for this course. You are also encouraged to concurrently register for Mathematical Physics I & II.
### Course Purpose
We are beset by an array of global concerns such as the depletion of food and energy resources, poverty and health problems, and the destruction of the natural- and living-environments. This course, by taking as its base recent developments in the field of life sciences, aims to propose possible solutions to the above, through the analysis of biological production, symbiosis, and frontier technology in the field of bioscience.

### Course Contents
1. Introduction (MURASE Jun)
2. Ecology of irrigated rice fields (MURASE Jun)
3. International cooperation (ITO Kasumi)
4. Basic reproductive endocrinology (TSUKAMURA Hiroko)
5. Molecular insect sciences (NIIMI Teruyuki)
6. Genetically modified crops (TANIGUCHI Mitsutaka, Joyce Abad CARTAGENA)
7. Enzyme engineering (IWASAKI Yugo)
8. Basic Crop Science (YAMAUCHI Akira)
9. Group discussion (MURASE Jun)
10. Remarks (MURASE Jun)

### Grading
Evaluation will be based on in-class participation and assignments.

### Text Book

<table>
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### Remarks
Japanese undergraduates and short-visit international students may also take the lecture.
# PHYSICAL CHEMISTRY I

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<td>Term (Semester)/Day/Period</td>
<td>III (2nd year, Fall semester) / Thu / 1 (8:45 – 10:15)</td>
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<tr>
<td>Instructor</td>
<td>BUTKO Peter</td>
<td></td>
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</tbody>
</table>
| Contact           | Office: SA Building-318-1 (Science & Agriculture)  
|                   | Phone: 789-2480  
|                   | E-mail: pbutko@chem.nagoya-u.ac.jp |

## Course Purpose
The purpose of this course is to learn what physical chemistry is all about and to grasp important principles and facts about physical chemistry. The course begins with perfect gas law, proceeds to thermodynamics, and finishes with applications of thermodynamics to simple mixtures.

## Course Contents
| 1 The Properties of Gases 1 (Ch. 1) | 9 Simple Mixtures 1 (Ch. 5) |
| 2 The Properties of Gases 2 (Ch. 1) | 10 Simple Mixtures 2 (Ch. 5) |
| 3 The First Law 1 (Ch. 2) | 11 Pre-exam Review & EXAM 2 (Chs. 3 – 5) |
| 4 The First Law 2 (Ch. 2) | 12 Chemical Equilibrium 1 (Ch. 6) |
| 5 Pre-exam Review & EXAM 1 (Chs. 1 & 2) | 13 Chemical Equilibrium 2 (Ch. 6) |
| 6 The Second Law 1 (Ch. 3) | 14 Pre-final Review |
| 7 The Second Law 2 (Ch. 3) | 15 FINAL EXAM (Ch. 1 – 6) |
| 8 The Physical Transformations of Pure Substances (Ch. 4) | |

## Grading
Two exams: 100 points each, final exam (comprehensive): 200, homework: 50. TOTAL: 450.
Grade "S": 100-90% (405 or more points), "A": 89-80% (404 - 360 pts), "B": 79-70% (359 - 315 pts), "C": 69-60% (314 - 270 pts), "F": 59-0% (fewer than 270 pts).

## Course Withdrawal
Yes. The last day to withdraw without academic penalty is November 25, 2013.

## Criteria for “Absent” & “Fail” Grades
The “Absent” grade is reserved for students that withdraw by November 25, 2013. After that day, a letter grade will be awarded based on grades earned from all assignments during the semester.

## Prerequisite
Fundamentals of Chemistry I and II

## Related Courses

## Textbook

## Remarks
It is essential to sit in each exam during the scheduled class time. **There will be NO make-up exam.** In the event of a missed exam due to a serious illness, accident or family emergency, compelling written documentation of the reason for the absence will be required. If the reason is accepted, the final grade will be calculated from the appropriately weighted average from the rest of the exams. If the reason will be deemed insufficient, the absence will be unexcused, and zero points will be awarded for the missed exam. **WARNING: Missing more than one exam (it does not matter whether excused or not) means automatically failing the course.**

Attendance is necessary for successful completion of this course. No points will be awarded for attending lectures, but attendance may be taken. Sleeping in the lecture hall will be actively discouraged.

Homework is crucial for mastering new material and developing skills in applying concepts. Weekly homework will be either on paper or electronic. Homework is due at the beginning of class on the due date. A general guideline says an average of 2 to 3 hours of study time per week is necessary for each 1 credit hour.

Exams focus on problem solving, and exam questions will be similar to the homework problems. Exam grades will be posted in the Gradebook on the Course website before next class period.

Cell phones must be turned off during lecture.
G30 Program (School of Agricultural Sciences), (Undergraduate)

<table>
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<td><strong>Term (Semester)/Day/Period</strong></td>
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<tr>
<td><strong>Instructor</strong></td>
</tr>
</tbody>
</table>
| **Contact** | School of Science, Division of Biological Sciences  
E building, room E202  
Phone: 052-789-3530  
E-mail: mnvassileva@bio.nagoya-u.ac.jp |

**Course Purpose**
This course will refresh and deepen basic knowledge of genetics, and is the beginning of a series of courses on Genetics that will stretch over two-year period. Students will learn fundamental processes of how genetic information can be inherited rigidly and flexibly from generation to generation. Students are expected to become adept at using appropriate scientific terminology, explain the basic genetics concepts and be able to analytically manipulate this information.

**Course Content**
- Maintenance of the genome
  - 1. Chromosomes, chromatin, and the nucleosome
  - 2. The DNA replication of DNA
  - 3. The mutability and repair of DNA
  - 4. Genetic recombination (homologous and site-specific recombination; transposition)

**Grading**
Evaluation will be based on in-class participation, assignments and examinations. While presence will not be marked, students are encouraged not to miss classes, as in-class participation will be considered an important element in overall grading.

**Course Withdrawal**
Submit Course Withdrawal Request form by the sixth lecture.

**Criteria for “Absent” & “Fail” Grades**
- Absent – based on submission of Course Withdrawal Request Form.
- Fail – based on “Failed” results of examinations and assignments.

**Prerequisite**
Basic knowledge of Genetics

**Related Courses**

**Text Book**

**Reference Book**
Essentials of Genetics, William S. Klug et al., Benjamin Cummings.

**Remarks**
The purpose of Statistical Physics I-III is to understand the basic laws that govern macroscopic bodies consisting of an enormous number of atoms and molecules. This first part of the course covers universal phenomenological laws, called thermodynamic laws, and their applications. The main focus of this course is to understand the basic principles of classical thermodynamics which are the basis for macroscopic understanding of all the physical phenomena. The applications in automotive engineering are also introduced.

Prerequisite Subjects

Course Topics

1. Thermal Equilibrium and Temperature
2. State Equations, Partial Differentials, Units and Dimensions
3. The First Law of Thermodynamics (energy, isothermal and adiabatic processes)
4. The Second Law of Thermodynamics
5. Entropy
6. Thermodynamic Functions
7. Phase Equilibrium and Chemical Equilibrium
8. Kinetic Theory and Statistical Mechanics

Textbook
Printed handouts will be provided.

Additional Reading
Modern Engineering Thermodynamics; Robert T. Balmer; Academic Press (2010)

Grade Assessment
Grades will be based on class participation, assignments and a final examination:
- 30% for attendance
- 30% for assignments
- 40% for final examination

Notes

Contacting Faculty
Students can ask questions at any time during classes. Questions during off-class hours can be asked at the lecturer's room (Engineering Building No.3 North Wing, Room 223 (3125)) or via e-mail: takimotof@nuem.nagoya-u.ac.jp
G30 Program (School of Agricultural Sciences), (Undergraduate)

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<tr>
<td><strong>Instructor</strong></td>
<td>Maria Vassileva</td>
</tr>
</tbody>
</table>
| **Contact** | School of Science, Division of Biological Sciences  
E building, room E202  
Phone: 052-789-3530  
E-mail: mnvassileva@bio.nagoya-u.ac.jp |

**Course Purpose**
This course is expected to refresh and deepen students’ knowledge in basic cell organization, and is the beginning of a series of courses on Cell Biology that will stretch over two-year period. The first part, Cell Biology 1, is concentrating on cell membrane structure and function as well as basic genetic mechanisms. Students are expected to become adept at using appropriate scientific terminology, explain the basic cell biology concepts and be able to analytically manipulate the information presented to solve scientific problems.

**Course Content**
1. Introduction to cells  
   1.1 Cell architecture  
   1.2 Chemical components of cells  
   1.3 Protein structure and function  
2. Cell membrane: Structure and Function  
   2.1 Membrane structure  
   2.2 Membrane transport  
3. DNA and chromosome: Basic genetic mechanisms  
   3.1 DNA replication, repair and recombination  
   3.2 DNA translation  
   3.3 Control of gene expression

**Grading**
Evaluation will be based on in-class participation, assignments and examinations. While presence will not be marked, students are encouraged not to miss classes, as in-class participation will be considered an important element in overall grading.

**Course Withdrawal**
Submit Course Withdrawal Request form by the sixth lecture.

**Criteria for “Absent” & “Fail” Grades**
Absent – based on submission of Course Withdrawal Request Form.  
Fail – based on “Failed” results of examinations and assignments.

**Prerequisite**
Basic knowledge of Biology of cell and Genetics

**Related Courses**
Genetics I

**Text Book**
Becker’s world of the cell (8 ed.), Hardin, Bertoni, Kleinsmith, Pearson

**Reference Book**

**Remarks**
Molecular Biology of the Cell, B. Alberts et al., Taylor & Francis.
QUANTUM MECHANICS I

Registration code: 0910813
Credits: 2.0

Course Category: Basic Specialized Courses
Classroom: A-407

Term (Semester)/Day/Period: IV (2nd year, Spring semester) / Mon / 1 (8:45 - 10:15)

Instructor: BUTKO Peter

Contact: Office: SA Building-318-1 (Science & Agriculture)
Phone: 789-2480
E-mail: pbutko@chem.nagoya-u.ac.jp

Course Purpose
"What exactly is so special about Quantum Mechanics?" The purpose of this course is to introduce quantum mechanics. It begins with an introduction to elementary quantum mechanics and builds up to convey thorough theoretical understanding of atomic electronic structure.

Course Contents
1. From Classical to Quantum Mechanics (Ch. 1)
2. Wave Packets and the Schrodinger Equation (Ch. 2)
3. The Quantum Mechanical Postulates (Ch. 3)
4. Pre-exam Review & EXAM 1 (Ch. 1 – 3)
5. The Particle in the Box 1 (Ch. 4)
6. The Particle in the Box 2 (Ch. 5)
7. Commuting and Non-commuting Operators and the Uncertainty Principle (Ch. 6)
8. Harmonic Oscillator: Classical and Quantum Mechanical 1 (Ch. 7)
9. Harmonic Oscillator: Classical and Quantum Mechanical 2 (Ch. 7)
10. Pre-exam Review & EXAM 2 (Ch. 4 – 7)
11. The Vibrational and Rotational Spectroscopy of Diatomic Molecules 1 (Ch. 8)
12. The Vibrational and Rotational Spectroscopy of Diatomic Molecules 2 (Ch. 8)
13. The Hydrogen Atom (Ch. 9)
14. Pre-final Review
15. FINAL EXAM (Ch. 1 – 9)

Grading
Two exams: 100 points each, final exam (comprehensive): 200, homework: 50.
TOTAL: 450.
Grade "S": 100-90% (405 or more points), "A": 89-80% (404 - 360 pts), "B": 79-70% (359 - 315 pts), "C": 69-60% (314 - 270 pts), "F": 59-0% (fewer than 270 pts).

Course Withdrawal
Yes. The last day to withdraw without academic penalty is May 23, 2014.

Criteria for “Absent” & “Fail” Grades
The “Absent” grade is reserved for students that withdraw by May 23, 2014. After that day, a letter grade will be awarded based on grades earned from all assignments throughout the semester.

Prerequisite
Fundamentals of Chemistry I and II, Fundamentals of Physics I to IV, Calculus I and II, Linear Algebra I and II, or permission of the instructor

Related Courses

Textbook

Remarks
It is essential to sit in each exam during the scheduled class time. There will be NO make-up exam. In the event of a missed exam due to a serious illness, accident or family emergency, compelling written documentation of the reason for the absence will be required. If the reason is accepted, the final grade will be calculated from the appropriately weighted average from the rest of the exams. If the reason will be deemed insufficient, the absence will be unexcused, and zero points will be awarded for the missed exam. WARNING: Missing more than one exam (it does not matter whether excused or not) means automatically failing the course.

Attendance is necessary for successful completion of this course. No points will be awarded for attending lectures, but attendance may be taken. Sleeping in the lecture hall will be actively discouraged.

Homework is crucial for mastering new material and developing skills in applying concepts. Weekly homework will be either on paper or electronic. Homework is due at the beginning of class on the due date. A general guideline says an average of 2 to 3 hours of study time per week is necessary for each 1 credit hour.

Exams focus on problem solving, and exam questions will be similar to the homework problems. Exam grades will be posted in the Gradebook on the Course website before next class period. Cell phones must be turned off during lecture.
## Biochemistry II

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<td>MIZUKAMI, Yukiko</td>
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</table>
| Contact           | Office: Science & Agriculture Building, Room 333 (SA333)  
|                   | Phone: (052-789-) 2967  
|                   | E-mail: ymizukami@bio.nagoya-u.ac.jp |

### Course Purpose
This course introduces students to the basic framework of the chemical reactions of life. Topics covered include the chemical and structural properties of carbohydrates and lipids; membrane structure, assembly, and transport; reaction kinetics and regulation of enzymes; hormones and signal transduction pathways.

### Course Contents

#### PART I: BIOMOLECULES

**A. Carbohydrates**
1. Monosaccharides, Disaccharides, & Polysaccharides
2. Glycoproteins

**B. Lipids & Bilayers**
3. Lipid Classification
4. Lipid Bilayers

**C. Membranes**
5. Membrane proteins
6. Membrane structure and assembly

**D. Membrane Transport**
7. Passive and Active transport

#### PART II: ENZYMES

**E. Enzyme Action**
8. General properties and catalytic mechanism
9. Lysozyme and serine proteases

**F. Properties of Enzymes**
10. Reaction kinetics and enzyme inhibition
11. Control of enzyme activity

**G. Signal transduction**
12. Hormones
13. Receptor tyrosine kinases
14. G protein
15. Phosphoinositide pathway

### Grading

**Grading materials:** Homework (10%); Attendance and participation (20%); Exams (70%).

**Grading scale:** S=90-100%; A=80-89%; B=70-79%; C=60-69%; F=below 59%.

### Course Withdrawal

With a written request sent to the instructor before/on May 7 via e-mail, you can cancel a course assignment without it appearing on your record.

### Prerequisite
Biochemistry I (Terms III)

### Textbook

### Reference Book
Will be introduced in class

### Remarks
Office hours: Thursday, 2:00 pm – 4:00 pm, or by an appointment via e-mail
# INORGANIC CHEMISTRY I

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<td>FISCHER, Berthold</td>
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**Course Category**

**Course Purpose**
The purpose of the course is to present the fundamental concepts and chemical principles of inorganic chemistry. This course is the first part of a three-semester sequence in inorganic chemistry, and deals with the basic principles including electronic structures, orbital, chemical bonds, and acids/bases.

**Course Contents**

1. The Electronic Structure of Atoms
2. Structure and Bonding in Molecules
3. Ionic Solids
4. The Chemistry of Selected Anions
5. Introduction to Coordination Chemistry
6. Solvents, Solutions, Acids, and Bases
7. The Periodic Table and the Chemistry of the Elements

**Grading**
Participation in discussion, Quizzes, Group presentations, homework: 50%
Final Exam 50%
TOTAL: 100%
Grade "S": 100-90% (90 or more points), "A": 89-80% (89 - 80 pts), "B": 79-70% (79-70 pts), "C": 69-60% (69-60 pts), "F": 59-0% (fewer than 59 pts).

**Criteria for “Absent” & “Fail” Grades**
Nagoya University approved system; students can withdraw from this course if they submit the request form to the instructor by the officially published date.

**Prerequisite**
Fundamentals of Chemistry I and II

**Related Courses**

**Text Book**
Inorganic Chemistry (Catherine Housecroft, Alan G. Sharpe) 4th Edition; Pearson-Prentice Hall

**Reference Book**
None

**Remarks**
# Electricity and Magnetism

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<th>WOJDYLO John</th>
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<tr>
<th>Contact</th>
<th>Office: Science Hall 5F 517</th>
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<tr>
<td></td>
<td>Phone: 052-789-2307</td>
</tr>
<tr>
<td></td>
<td>Email: <a href="mailto:john.wojdylo@s.phys.nagoya-u.ac.jp">john.wojdylo@s.phys.nagoya-u.ac.jp</a></td>
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</table>

## Course Purpose
This course offers a solid introduction to electrostatics and magnetostatics. It also introduces fundamental mathematical methods required to solve problems in physics, engineering and applied mathematics.

## Course Contents
- Revision of vector calculus, curvilinear coordinates, Dirac Delta Function.

## Grading
- Attendance: 10%  
- Weekly Quizzes: 20%  
- Mid-term exam: 30%  
- Final Exam: 40%

## Course Withdrawal

## Criteria for “Absent” & “Fail” Grades
The “Absent” grade is reserved for students who withdraw by May 16. After that day, a letter grade will be awarded based on marks earned from all assessment during the semester.

## Prerequisites
- Calculus I&II: Fundamentals of Physics III&IV; Mathematical Physics II or Consent of Instructor.

## Related Courses
- Physics Tutorial IIA

## Text Book
(Most of the material will be taken from this book.)

## Recommended Reading
(Highly recommended alternative reading.)

## Remarks
- Concurrent registration in Physics Tutorial IIA is advised.
- Unless a prior special arrangement is made with the lecturer, students must be familiar with vector calculus (div, grad, curl; line, surface, volume integrals; etc.) to take this course. (Vector calculus is taught in Mathematical Physics II.)
### Genetics II

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</table>
| Contact           | Office: Science & Agriculture Building, Room 333 (SA333)  
Phone: (052-789-) 2967  
E-mail: ymizukami@bio.nagoya-u.ac.jp | |

#### Course Purpose
This course aims to introduce students to fundamental molecular mechanisms underlying expression of the genome. The entire course will discuss the molecular and regulatory mechanisms of transcription, RNA processing, translation in both bacterial and eukaryotic cells, and the principle and universality of the genetic code.

#### Course Contents

**A. Mechanisms of Transcription**
1. RNA polymerase and transcription cycle
2. The transcription cycle in bacteria
3. Transcription in eukaryote
4. Transcription by RNA polymerases I & III

**B. RNA Splicing**
5. The chemistry of RNA splicing
6. The spliceosome machinery
7. Splicing pathways
8. Alternative splicing
9. Exon shuffling & RNA editing
10. mRNA transport

**C. Translation**
11. Messenger RNA
12. Transfer RNA
13. Attachment of amino acids to tRNA
14. The ribosome
15. Initiation, elongation, and termination of translation
16. Regulation of translation

**D. The Genetic Code**
17. The code
18. Three rules
19. Suppressor mutations
20. Universality

#### Grading
**Grading materials:** Homework (10%); Attendance and participation (20%); Exams (70%).  
**Grading scale:** S=90-100%; A=80-89%; B=70-79%; C=60-69%; F=below 59%.

#### Course Withdrawal
With a written request sent to the instructor before/on May 7 via e-mail, you can cancel a course assignment without it appearing on your record.

#### Criteria for “Absent” & “Fail” Grades
No “Absent” grade will be given in this course. Students who fail to attend 3 or more lectures will immediately get an “F (Fail)” grade.

#### Prerequisite
Genetics I (Terms III)

#### Related Courses
Genetics I, III, and IV (Terms III, V, and VI, respectively)

#### Textbook

#### Reference Books
Will be introduced in class

#### Remarks
*Office hours:* Thursday, 2:00 pm – 4:00 pm, or by an appointment via e-mail
Course Type: Specialized Courses

Course Purpose: The main purpose of this course is to acquire a logical framework for understanding fundamental organic chemistry. This framework provides the influence for each type of organic chemical reactions and the corresponding mechanisms. On the basis of this understanding, we consecutively learn how to solve the practical problems in organic chemistry.

Prerequisite Subjects: Fundamentals of Chemistry I and II, and Organic Chemistry I

Course Topics:
1. Properties and Reaction of Haloalkanes
   - Physical Properties of Haloalkanes
   - Aliphatic Nucleophilic Substitutions
     - SN2 Reactions and their Competing Reactions
     - SN1 Reactions and their Competing Reactions
2. Properties and Reaction of Benzene
   - Electrophilic Aromatic Substitutions
   - Electrophilic Attack on Derivatives of Benzene
   - Nucleophilic Aromatic Substitutions
3. Radical Reactions; Substitutions and Additions


Additional Reading:

Grade Assessment:
- Examination (50%)
- Attendance (20%)
- Homework and Quiz (30%): S(x≧90), A(90>x≧80), B(80>x≧70), C(70>x≧60), and F(60>x)

Notes:
1. Course Withdrawal: Student can withdraw the course with a submission of the requirement during a certain period prepared for course-withdrawal by university.
2. Criteria for "Absent" & "Fail" Grades: A maximum of three absences can be authorized: submissions of student sickness/absence reporting are required.

Contacting Faculty:
Students can communicate with their course instructor face-to-face either in the corresponding classes or in the appointment times. Communication via email is also available.

Class Format: Lecture

Course Name: Chemistry

Starts: 12 Spring Semester

Elective/Compulsory: Elective

Lecturer: Jiyoung Shin

Designated Associate Professor

Course Code: 0913005

Registration code: 0913005
## Physiology II

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<tr>
<td>Instructor</td>
<td>Maria Vassileva</td>
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</table>
| Contact | School of Science, Division of Biological Sciences  
E building, room E202  
Phone: 052-789-3530  
E-mail: mnvassileva@bio.nagoya-u.ac.jp |

### Course Purpose
This course is designed as a continuation of the Animal anatomy and physiology module in Fundamentals of Biology 2. Students will deepen their knowledge of animal physiology and understanding of the normal function of tissues and organ systems. Students are expected to become adept at using appropriate scientific terminology, explain the basic physiology concepts and be able to analytically manipulate the information presented to solve scientific problems.

### Course Contents
1. Cardiovascular system  
2. Respiratory system  
3. Renal system  
4. Gastrointestinal system  
5. Endocrine system  
6. Reproductive system

### Grading
Evaluation will be based on in-class participation, assignments and examinations. While presence will not be marked, students are encouraged not to miss classes, as in-class participation will be considered an important element in overall grading.

### Course Withdrawal
Submit Course Withdrawal Request form by the sixth lecture.

### Criteria for “Absent” & “Fail” Grades
- Absent – based on submission of Course Withdrawal Request Form.  
- Fail – based on “Failed” results of examinations and assignments.

### Prerequisite
Basic knowledge of animal anatomy and physiology

### Related Courses

|-----------|----------------------------------------------------------------------------------|
| Reference Book | Physiology, 3rd ed., Constanzo, LS, W.B. Saunders Company  

### Remarks
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<td>CARTAGENA Joyce Abad</td>
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</table>
| Contact           | Office: Rm. B508A, Building B, Graduate School of Bioagricultural Sciences  
|                   | Phone: 789-5209  
|                   | E-mail: joyce@agr.nagoya-u.ac.jp |

**Course Purpose**
This course will provide the essential concepts on how plant and animal cells generate energy in order to carry out biological processes and sustain life. Furthermore, the mechanisms of intracellular transport and how cells respond to the environment will be discussed. This course will also prepare the students for basic scientific writing.

**Course Contents**
1. How Cells Obtain Energy from Food  
2. Energy Generation in Mitochondria and Chloroplasts  
3. Intracellular Compartments and Transport  
4. Cell Communication

**Grading**
In-class participation (20%), Quizzes (20%), Scientific paper (20%), Examinations (40%)

**Course Withdrawal**
Students who wish to withdraw from the course will have to submit a duly accomplished Course Withdrawal Request by the 7th lecture.

**Criteria for “Absent” & “Fail” Grades**
Absent: Approved Course Withdrawal Request  
Fail: Total accumulated score of less than 60%

**Prerequisite**
Related Courses
Cell Biology I

**Text Book**
Essential Cell Biology, Third Edition  
B. Alberts et al., Garland Science, 2009

**Reference Book**
1. Becker’s World of the Cell, Eighth Edition  
   J. Hardin et al., Pearson, 2012  
   B. Alberts et al., Taylor and Francis, 2007

**Remarks**
# Biophysics

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## Term (Semester)/Day/Period
IV (2nd year, Spring semester)/ Fri / 2 (10:30 - 12:00)

## Instructor
OKAMOTO Yuko

## Contact
Office: Science Hall 5F 510, Phone: 052-789-3528, Email: okamoto@phys.nagoya-u.ac.jp

## Course Purpose
To understand the basics of biophysics, in which biological phenomena are described in terms of physics language.

## Course Contents
1. Brief history of biophysics
2. Biomolecules – amino acids and proteins
3. Biomolecules – nucleic acids
4. Biomolecules – lipids and membranes
5. Central dogma of molecular biology
6. Protein folding and salvation effects
7. Asakura-Oosawa theory of depletion forces
8. Protein unfolding (denaturation) at high temperature and by denaturants
9. Cold denaturation of proteins
10. Protein unfolding at high pressure
11. Computer simulations of protein folding and unfolding

## Grading
Evaluation will be based on attendance and reports (take-home exams).

## Course Withdrawal
Student can withdraw the course with submission of the requirement during a certain period prepared for course-withdrawal by University.

## Criteria for “Absent” & “Fail” Grades
Class attendance is required. Absentee must give a valid reason. A student will be regarded as ABSENT if he/she is absent from lecture more than 3 times or he/she is absent without valid reason from the final exam. A student who is NOT ABSENT but wishes to be considered as ABSENT must see the instructor immediately after the final exam.

## Prerequisite
Preferrably, Fundamentals of Physics I, II, III, and IV.

## Related Courses

### Text Book

### Reference Book

### Remarks
2013 (Term V ~ VI)
SCHOOL SPECIFIC COURSE
SYLLABUS FOR G30 PROGRAM
(School of Agricultural Sciences)
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**Term (Semester)/Day/Period**  
V (3rd year, Fall semester) / Fri / 1 (8:45 - 10:15)

**Instructor**  
HUMBLET Marc Andre

**Contact**  
Office: Graduate School of Environmental Studies  
Department of Earth and Planetary Sciences E516  
Phone: 789-3037  
E-mail: humblet.marc@f.mbox.nagoya-u.ac.jp

## Course Purpose
In this course students will learn about the characteristics of the planets and other components of our solar system with the Earth as background reference. The course will review the various means of space exploration and discuss examples of ongoing missions and the future of space exploration. We will also reflect on one of the most exciting scientific endeavor: the quest for extraterrestrial life.

### Course Contents
1. Introduction to the Solar System  
2. Space exploration  
3. The planets and their satellites  
4. Asteroids, comets, meteorites  
5. Mars Exploration Rovers  
6. The Cassini Mission  
7. The search for extraterrestrial life

### Grading
Students will be graded following the five-step S-A-B-C-F grade evaluation system.  
S: 90-100%, A: 80-89%, B: 70-79%, C:60-69%, F: 59-0%

- Two quizzes: 30% (15% each)  
- Oral presentation: 30%  
- Written essays: 40%

**Course Withdrawal**  
A student who wishes to withdraw from the course must submit a withdrawal request form to the instructor by the 15th of November in order to receive an “Absent” grade.

**Criteria for “Absent” & “Fail” Grades**  
A student will be given an “Absent” grade if he or she submits a Course Withdrawal Request by the 15th of November. This deadline does not apply to students who drop the class part-way through for an exceptional reason (e.g. illness, accident). A “Fail” grade is given to students who obtain a final score of less than 60%.

**Prerequisite**  
None

**Text Book**  
None

**Reference Book**  
None

**Remarks**  
None

**Related Courses**  
Fundamentals of Earth Science I & II
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<td>HUMBLET Marc Andre</td>
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</tbody>
</table>
| Contact | Office: Graduate School of Environmental Studies  
Department of Earth and Planetary Sciences E516  
Phone: 789-3037  
E-mail: humblet.marc@f.mbox.nagoya-u.ac.jp |
| Course Purpose | TBA |
| Course Contents | TBA |
| Grading | TBA |
| Course Withdrawal | TBA |
| Criteria for “Absent” & “Fail” Grades | TBA |
| Prerequisite | TBA |
| Related Courses | TBA |
| Text Book | TBA |
| Reference Book | TBA |
| Remarks | TBA |
# Plant Physiology

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<tr>
<td>Instructor</td>
<td>MIZUKAMI, Yukiko</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| Contact | Office: Science & Agriculture Building, Room 333 (SA333)  
Phone: (052-789-) 2967  
E-mail: ymizukami@bio.nagoya-u.ac.jp |

### Course Purpose
This course provides students with a comprehensive understanding of concepts, principles, and strategies concerning the basic mechanisms underlying plant growth, development, and survival. Topics covered include mineral nutrition, solute transport, photosynthesis, respiration, metabolism, environmental and developmental signals, and plant hormone action.

### Course Contents
1. **Plant Cells**: Overview of plant structure; The endomembrane system; The plant cytoskeleton; The plant cell cycle; Plasmodesmata.
2. **Genome Organization & Gene Expression**: Nuclear genome organization; Plant cytoplasmic genomes; Posttranslational regulation; Genetic modification of plants; Tools for studying plant genes.
3. **Mineral Nutrition & Solute Transport**: Essential Nutrients; Nutritional Deficiencies; Soil, roots, and microbes.
4. **Overview of Photosynthesis & Translocation in the Phloem**: General concepts, Pathways of translocation; Phloem loading & unloading; Photosynthesize distribution.
5. **Respiration**: Overview of plant respiration; Plant glycolysis; Respiration in intact plants.
6. **Plant Defense & Adaptation to Abiotic Stress**: Secondary metabolites & plant defense; Biotic & abiotic stresses; Adaptation & plasticity; Developmental; & physiological mechanisms.
7. **Cell Walls: Structure, Biogenesis, and Expansion**: Structure & synthesis; Patterns of cell expansion; The rate of cell expansion.
8. **Plant Hormones in Growth and Development**: AUXIN: Overview of plant growth; The auxin concepts; Transport; Signal transduction pathways; Actions & effects.
9. **Plant Hormones in Growth and Development**: GIBBERELLINS: Discovery & Structure; Effects on plant growth; Biosynthesis & deactivation; GA signaling; GA responses.
10. **Plant Hormones in Growth and Development**: CYTOKININS: Cell division & plant growth; Biosynthesis, metabolism, & transport; Cytokinin signaling; Biological roles.
11. **Plant Hormones in Growth and Development**: ABSCISIC ACID: Chemical structure; Biosynthesis, metabolism, & transport; Signal transduction pathways; Biological roles.
12. **Plant Hormones in Growth and Development**: ETHYLENE & BRASSINOSTEROIDS: Structure & biosynthesis; Signal transduction pathways; Effects on growth & development.

### Grading
**Grading materials**: Presentations (20%); Attendance and participation (20%); Exams (60%).
**Grading scale**: S=90-100%; A=80-89%; B=70-79%; C=60-69%; F=below 59%.

### Course Withdrawal
With a written request sent to the instructor before/on **October 28** via e-mail, you can cancel a course assignment without it appearing on your record.

### Criteria for “Absent” & “Fail” Grades
No “Absent” grade will be given in this course. Students who fail to attend 3 or more lectures will immediately get an “F (Fail)” grade.

### Related Courses
Physiology I

### Textbook
ISBN: 0878935657

### Reference Book
Biochemistry & Molecular Biology of Plants (1st edition, 2002) by Buchanan, B., Gruissem, W., and Jones, R., Wiley, USA.  
ISBN: 0943088399

### Remarks
Office hours: Thursday, 2:00 pm – 4:00 pm, or by an appointment via e-mail
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<tr>
<td>Instructor</td>
<td>MAKI Kosuke</td>
<td></td>
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</tr>
<tr>
<td>Contact</td>
<td>Office: Science Hall 6F 619</td>
<td></td>
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</tr>
<tr>
<td></td>
<td>Phone: 052-789-2434</td>
<td></td>
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<tr>
<td></td>
<td>E-mail: <a href="mailto:k_maki@synapse.phys.nagoya-u.ac.jp">k_maki@synapse.phys.nagoya-u.ac.jp</a></td>
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</table>

**Course Purpose**
To learn physical basis of chemical phenomena such as phase and chemical equilibrium, and chemical kinetics. Advanced topics will be shown depending on the progress.

**Course Contents**
1. Review of basic thermodynamics
2. Thermodynamics of multi-component systems
3. Chemical equilibrium
4. Phase equilibrium
5. Chemical kinetics
6. Advanced topics

**Grading**
Evaluation will be based on a report.

**Course Withdrawal**
Student can withdraw the course with a submission of the requirement during a certain period prepared for course-withdrawal by university.

**Criteria for “Absent” & “Fail” Grades**
The “Absent” grade is reserved for students that withdraw.

**Prerequisite**

**Related Courses**
Physical chemistry I, Statistical physics I

**Text Book**

**Reference Book**
1. Donald A. McQuarrie, John D. Simon *Physical Chemistry: A Molecular Approach*, Univ Science Books
2. Charles R. Cantor, Paul R. Schimmel Biophysical Chemistry (Pt. I-III), W H Freeman & Co

**Remarks**
### Genetics III

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<tr>
<td>V (3rd year Fall semester) / Wed / 2 (10:30 – 12:00)</td>
<td>KANAMORI Akira, KAMIKOUCHI Azusa, YAGI Yoshimasa, GOSHIMA Gohta</td>
</tr>
</tbody>
</table>

**Contact**
School of Science, Division of Biological Sciences  
A building, room A233  
Phone: 052-788-6175  
E-mail: goshima@bio.nagoya-u.ac.jp

**Course Purpose**  
This course introduces the principles of molecular genetics.

**Course Content**
Topics: Regulation of gene expression, genomics, systems biology, and methodology.  

Lectures will be given by 4 faculty members of Division of Biological Science.
- Chapter 16 by Akira Kanamori  
- Chapter 17 by Akira Kanamori and Azusa Kamikouchi  
- Chapter 18 by Azusa Kamikouchi  
- Chapter 19 by Yoshimasa Yagi  
- Chapter 20 by Yoshimasa Yagi and Gohta Goshima  
- Chapter 21, 22 by Gohta Goshima

**Grading**
Evaluation will be based on in-class participation, assignments, and examinations.  
Students are encouraged not to miss classes, as in-class participation will be considered an important element in overall grading.

**Course Withdrawal**
Submit Course Withdrawal Request form by the sixth lecture.

**Criteria for “Absent” & “Fail” Grades**
- Absent – based on submission of Course Withdrawal Request Form.  
- Fail – based on “Failed” results of examinations and assignments.

**Prerequisite**
Basic knowledge on molecular genetics

**Related Courses**

**Text Book**
Molecular Biology of the Gene, James D. Watson et al. (6th edition)

**Reference Book**

**Remarks**
G30 Program (School of Agricultural Sciences),  (Undergraduate)

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</table>
| V (3rd year, Fall semester) / Thu / 1(8:45 - 10:15) | IRLE Stephan | Office: SA Building-424 (Science & Agriculture)  
Phone: 747-6397  
E-mail: sirle@chem.nagoya-u.ac.jp |

**Course Purpose**

“How can computers help with chemistry?” The purpose of this course is to introduce computer science from a chemist’s perspective. The course begins with an introduction to the basic use of computers for data search and molecular structure and spectroscopic visualization, and introduces FORTRAN 90 as a way to solve simple scientific problems in an efficient way.

**Course Contents**

1. Using the computer: Searching for information  
2. Constructing and viewing 3-dimensional models of molecules: GaussView, MOLDEN programs  
3. Overview over commercial molecular modeling packages  
4. Introduction to FORTRAN 90: Compilers, etc.  
5. Data Types, Constants, and Variables  
6. If, else if, case expressions  
7. Do loops  
8. Functions and subprograms  
9. Application: Data processing and visualization using GNUplot  
10. Molecular dynamics simulations

**Grading**

By submitting assignments

**Course Withdrawal**  

**Criteria for “Absent” & “Fail” Grades**

**Prerequisite**

**Related Courses**  
Mechanics, Statistical Mechanics

**Text Book**

Larry Nyhoff, Sanford Leestma: Introduction to FORTRAN 90 (Japanese version available)

**Reference Book**

**Remarks**
# Cell Biology III

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<tr>
<td>V (3rd year, Fall semester) / Thu / 2</td>
<td>Makoto Kinoshita, Shin Sugiyama, Keita Ohsumi, Yoshiaki Hirako, Naoki Hisamoto, and Tetsuya Higashiyama</td>
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<tr>
<td>Division of Biological Sciences, School of Science, SS323, Science South building</td>
</tr>
<tr>
<td>Phone: 052-789-3653</td>
</tr>
<tr>
<td>E-mail: <a href="mailto:kinoshita.makoto@c.mbox.nagoya-u.ac.jp">kinoshita.makoto@c.mbox.nagoya-u.ac.jp</a></td>
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**Course Purpose**
This course covers basic topics in cell biology. Students who successfully complete this course will understand fundamental biological phenomena at the molecular and cellular levels that include the cytoskeletal systems, mitosis and meiosis, and intercellular communications in multicellular organisms. They will develop insights into the complexities of cell structure and function, the underlying molecular events, the dynamic properties of living cells, and how these contribute to the generation and functioning of the whole organism.

**Course Content**
Oct 3, 10, 17: Chapter 17 Cytoskeleton (by Kinoshita)  
Oct 24, 31, Nov 7, 14: Chapter 18 The Cell Division Cycle (by Sugiyama & Ohsumi)  
Nov 21: Chapter 18 Sex and Genetics (by Sugiyama)  
Nov 28: (Special 1) Animal Cell Biology (by Sugiyama)  
Dec 5, 12: Chapter 19 Cellular Communities: Tissues, Stem Cells and Cancer (by Hirako & Hisamoto)  
Dec 19: (Special 2) Plant Cell Biology (by Higashiyama)  
Jan 16: Exam

**Grading**
Evaluation will be based on in-class participation, assignments, and examinations.

**Course Withdrawal**
Submit Course Withdrawal Request form by the sixth lecture.

**Criteria for “Absent” & “Fail” Grades**
Absent – based on submission of Course Withdrawal Request Form.  
Fail – based on “Failed” results of examinations and assignments.

**Prerequisite**
Basic knowledge on molecular biology

**Related Courses**

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<td>Essential Cell Biology (3rd ed.)</td>
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<td>Bruce Alberts et al.</td>
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**Remarks**
Biochemistry III

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<tr>
<td>SAWADA Hitoshi etc.</td>
<td>Office: Building B, room B315&lt;br&gt;Phone: 052-789-2514&lt;br&gt;Email: <a href="mailto:hsawada@bio.nagoya-u.ac.jp">hsawada@bio.nagoya-u.ac.jp</a></td>
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Course Purpose
This course focused on the metabolisms of biomolecules (Part IV, METABOLISM in the textbook), including carbohydrates, lipids, amino acids/proteins, and nucleic acids. The students learn the concept of free energy, mechanism of ATP production, catabolism and anabolism of biomolecules.

Course Contents
1. Bioenergetics
2. Glycolysis and the pentose phosphate pathway
3. Additional pathways in carbohydrate metabolism (Glycogen metabolism and gluconeogenesis)
4. The citric acid cycle
5. Mitochondrial ATP synthesis
6. Photosynthesis
7. Synthesis and degradation of lipids
8. Synthesis and degradation of amino acids
9. Regulation of fuel metabolism

Grading
Evaluation will be based on in-class participation, assignments and examinations. Presence will be marked. In-class participation will be considered an important element in overall grading.

Criteria for “Absent” & “Fail” Grades
Absent – based on submission of Course Withdrawal Request Form. Fail – based on “Failed” results of examinations and assignments.

Prerequisite
Biochemistry I and II
Basic knowledge of biology and chemistry

Text Book
Principles of Biochemistry (2013), International Student Version (Fourth edition) by Donald Voet, Judith G. Voet, Charlotte W. Pratt (John Wiley & Sons)

Reference Book
### Bioorganic Chemistry

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**Course Category**
- Specialized Courses

**Class room**
- Room 6

**Term (Semester)/Day/Period**
- VI (3rd year Spring semester) / Mon / 2 (10:30-12:00)

**Instructor**
- ○ OJIKA Makoto, NISHIKAWA Toshio, AOI Keigo, KITAJIMA Ken, UCHIDA Koji

**Contact**
- Office: A-Building, Room-650 (School of agriculture)
- Phone: 052-789-4116
- E-mail: ojika@agr.nagoya-u.ac.jp

### Course Purpose
To understand what the organic compounds are, including biomolecules (primary metabolites) and natural products (secondary metabolites), what they are composed of, and how they react to produce another organic compound. Biologically active small molecules, most of which are organic compounds, are also introduced. Such knowledge is basis for applied chemistry and industry, for example, in developing pharmaceuticals and pesticides.

### Course Contents
1. Basic Organic Chemistry (NISHIKAWA Toshio)
2. Secondary Metabolites and Spectroscopic Analysis (OJIKA Makoto)
3. Amino acids, peptides, and proteins (UCHIDA Koji)
4. Nucleic acids and other polymers (AOI Keigo)
5. Carbohydrates (KITAJIMA Ken)
   - (Each content consists of 2 or 3 classes)

### Grading
- Examination (70%), Attendance, Homework and Quiz (30%).

### Course Withdrawal
- Students can withdraw the course by submitting the requirement.

### Criteria for “Absent” & “Fail” Grades
- A maximum three absences can be authorized by submitting a student sickness/absence report.

### Prerequisite
- Organic Chemistry I and II

### Related Courses
- Organic Chemistry III and IV

### Text Book
Course Type: Specialized Courses

Course Purpose:
The purpose of this course is to present an overview of cutting-edge organic chemistry, and to learn important principles and facets of modern chemistry. The course includes sophisticated catalysts and reagents (organic-based and metal-based) for making useful compounds, designer functional organic molecules with various optoelectronic properties, and synthesis of natural products and biologically active complex molecules.

Prerequisite Subjects:
Organic Chemistry 1-5

Course Topics:
1. Organocatalysts for Green Chemistry
2. Chiral Catalysts for Enantioselective Synthesis
3. Transition Metal Catalysts for Unreactive Bond Activation
4. Synthesis of Optoelectronic Materials
5. Synthesis of Natural Products and Biologically Active Compounds

Textbook:
None

Additional Reading:

Grade Assessment:
Grades will be based on reports. Grades: “S”: 100-90%, “A”: 89-80%, “B”: 79-70%, “C”: 69-60%, “F”: 59-0%.

Notes:

Contacting Faculty:
Students can communicate with their lecturers during lectures, office hours, or via email.

Class Format: Lecture
Course Name: Chemistry
Starts: 13 Spring Semester
Elective/Compulsory: Elective
Lecturer: Faculty of Chemistry
Current Course: Organic and Polymer Chemistry (2.0 credits) (先端有機・高分子化学)
Registration code: 0913073
### Microbiology

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<th>Contact</th>
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</table>
| VI (3rd year Spring semester) / Tue/2 (10:30-12:00) | □ KOBAYASHI Tetsuo, KIMURA Makoto | Office: Science and Agricultural Building, Room SA-122  
Phone: 052-789-4085  
E-mail: koba@agr.nagoya-u.ac.jp |

**Course Purpose**
This course aims to help students to understand diversity of the microbial world in view of phylogeny, habitats, and metabolism. Starting with basic knowledge on Microbiology including molecular biological and genetic aspects, the main focus will be put on metabolic diversity, which is followed by brief introduction to Applied Microbiology.

**Course Contents**
1. Basic principles of Microbiology  
2. Metabolism and Growth  
3. Bacterial and Archaeal Molecular Biology  
4. Genetics of Bacteria and Archaea  
5. Metabolic diversity and Commercial Biocatalyses

**Grading**
Based on scores of examinations.

**Course Withdrawal**
Students who wish to withdraw from the course will have to submit Withdrawal Request by the 6th lecture.

**Criteria for “Absent” & “Fail” Grades**
- Absent: Approved Course Withdrawal Request  
- Fail: Total score of less than 60%

**Prerequisite**
Biochemistry I, II and III

**Related Courses**

**Text Book**
Brock Biology of Microorganisms, 13th Edition  
Michael Madigan, John Martinko, David Stahl, David Clark (Pearson)

**Reference Book**

**Remarks**
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<td><strong>Instructor</strong></td>
</tr>
</tbody>
</table>
| **Contact** | School of Science, Division of Biological Sciences  
E building, room E202  
Phone: 052-789-3530  
E-mail: mnvassileva@bio.nagoya-u.ac.jp |

**Course Purpose**
Students will deepen their knowledge of animal physiology and understanding of the normal function of tissues and organ systems. Students are expected to become adept at using appropriate scientific terminology, explain the basic physiology concepts and be able to analytically manipulate the information presented to solve scientific problems.

**Course Contents**
1. Cellular physiology  
2. Autonomic nervous system  
3. Cardiovascular system  
4. Respiratory system  
5. Renal system  
6. Gastrointestinal system  
7. Endocrine system  
8. Reproductive system

**Grading**
Evaluation will be based on in-class participation, assignments and examinations. While presence will not be marked, students are encouraged not to miss classes, as in-class participation will be considered an important element in overall grading.

**Course Withdrawal**
Submit Course Withdrawal Request form by the sixth lecture.

**Criteria for “Absent” & “Fail” Grades**
- Absent – based on submission of Course Withdrawal Request Form.  
- Fail – based on “Failed” results of examinations and assignments.

**Prerequisite**
Basic knowledge of animal anatomy and physiology

**Related Courses**

| **Text Book** | Human Physiology an integrated approach, 5ed., Silverthorn, Pearson  
Berne & Levy Principles of Physiology, 4th ed., Levy, MN, Koeppen, BM, & Stanton BA, Mosby  
Physiology, 3rd ed., Constanzo, LS, W.B. Saunders Company  
| **Reference Book** |
| **Remarks** |
### Biochemistry IV

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<td>Instructor</td>
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#### Course Purpose
This course is aimed at expanding students’ knowledge in basics of the gene expression and replication from biochemical aspects, including metabolism, structure and molecular function of DNA, RNA and related proteins.

#### Course Contents
- Part V “Gene expression and replication” of the text book
- 1. DNA structure and interaction with proteins
- 2. DNA synthesis
- 3. DNA repair and recombination
- 4. RNA metabolism: transcription and posttranscriptional processing
- 5. Transfer RNA and ribosomes
- 6. Translation and posttranslational processing
- 7. Gene organization and regulation of gene expression

#### Grading
Evaluation will be based on examinations at the end of course.

#### Course Withdrawal
Submit Course Withdrawal Request Form by the sixth lecture.

#### Criteria for “Absent” & “Fail” Grades
- Absent: based on submission of Course Withdrawal Request Form.
- Fail: based on failure in the examinations

#### Prerequisite
- Biochemistry I, II and III
- Basic knowledge of biology and chemistry

#### Related Courses
- Cell Biology I and II, Genetics I and II

#### Text Book
- Principles of Biochemistry International Student Version, Forth edition
  - Voet D, Voet JG, Pratt CW (John Wiley & Sons)

#### Reference Book
- Molecular Biology of the Cell, Alberts B et al. (Taylor & Francis)

#### Remarks
G30 Program (School of Agricultural Sciences), (Undergraduate)

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<tr>
<td><strong>Registration code</strong></td>
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**Course Purpose**
This course covers advanced topics in molecular cell biology, including application and methods. Students will learn how research on molecular cell biology is achieved with advanced technology in the particular areas of post-transcriptional regulation, membrane traffic, ion transport, biomedicines, live cell imaging, etc.

**Course Contents**
(1~4) Introduction of the course, post-transcriptional regulation and calcium homeostasis (by Maki)
(5~8) Ion channels and their associated molecules in heart and muscles (by Maturana)
(9~12) Biomedicines based on nanotechnology and biotechnology (by Kuroda)
(13) Biology of epithelial cells and hepatocytology (by Oda)
(14) Visualizing cells using fluorescence microscopy (by Shibata)
(15) Exam

**Grading**
Evaluation will be based on in-class participation, assignments, and examinations.

**Course Withdrawal**
Submit Course Withdrawal Request form by the sixth lecture.

**Criteria for “Absent” & “Fail” Grades**
Absent – based on submission of Course Withdrawal Request Form; Fail – based on “Failed” results of examinations and assignments.

**Prerequisite**
Basic knowledge on molecular biology

**Related Courses**
Cell Biology I, II, and III

**Text Book**
Essential Cell Biology (3rd ed.) Bruce Alberts et al.; Molecular Biology of the Cell (5th ed.)

**Remarks**