ICU

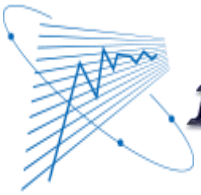
Expanding Potential

Introduction to the Natural Science Majors Course Planning Guide Booklet

Biology

Chemistry

Environmental studies



Information Science

Mathematics

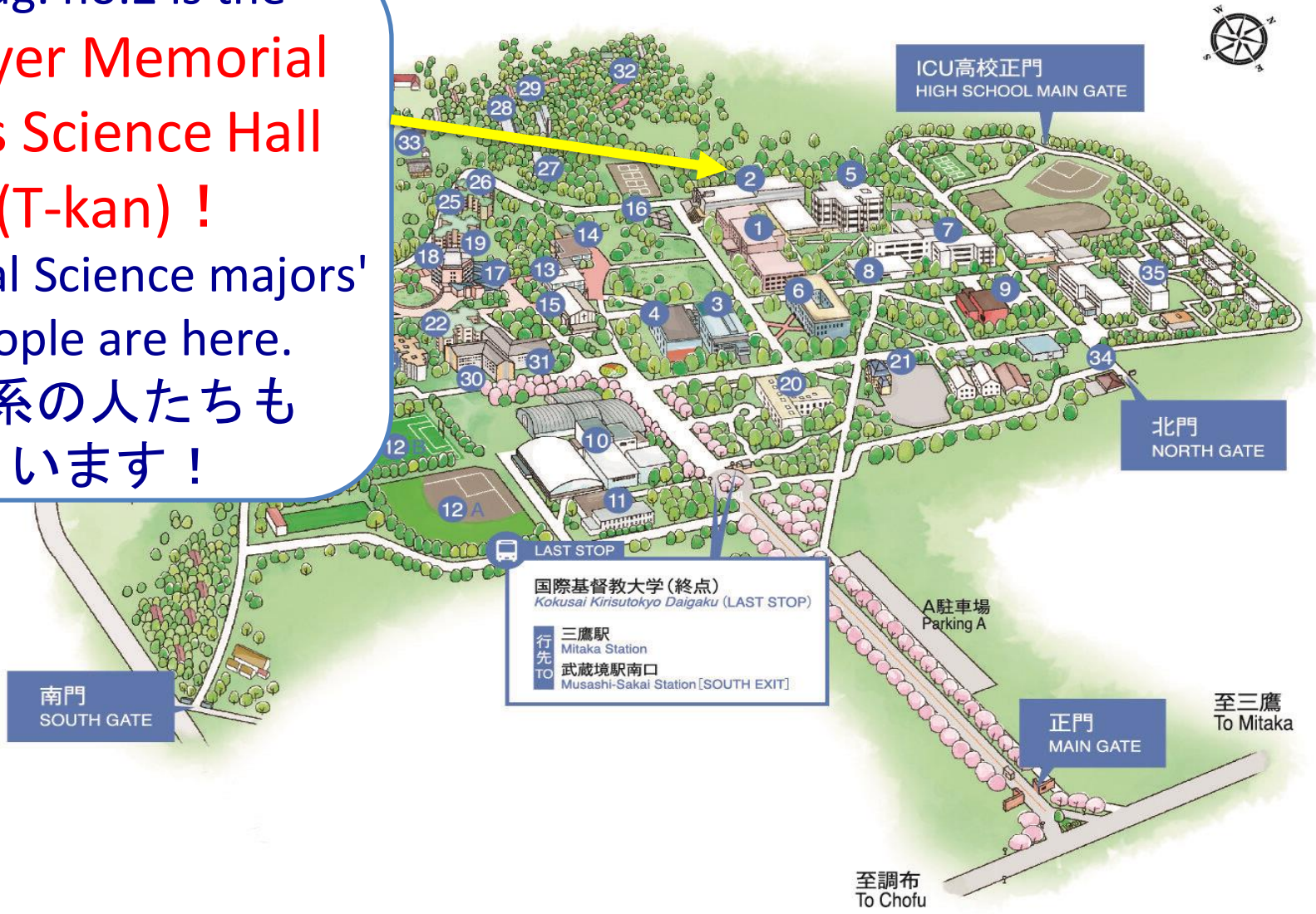
Physics

生物学・化学・情報科学・数学・物理学・環境研究 自然科学系メジャー履修計画の手引き

2023 September

Where can you find NS majors ?

Bldg. no.2 is the
Troyer Memorial
Arts Science Hall
(T-kan) !
Natural Science majors' people are here.
理系の人たちもいます！



Troyer Memorial Arts Science Hall

Outlook from the southwest

Outlook from the southeast

ぜひ研究室も見に来てください
Please come and visit our laboratories !

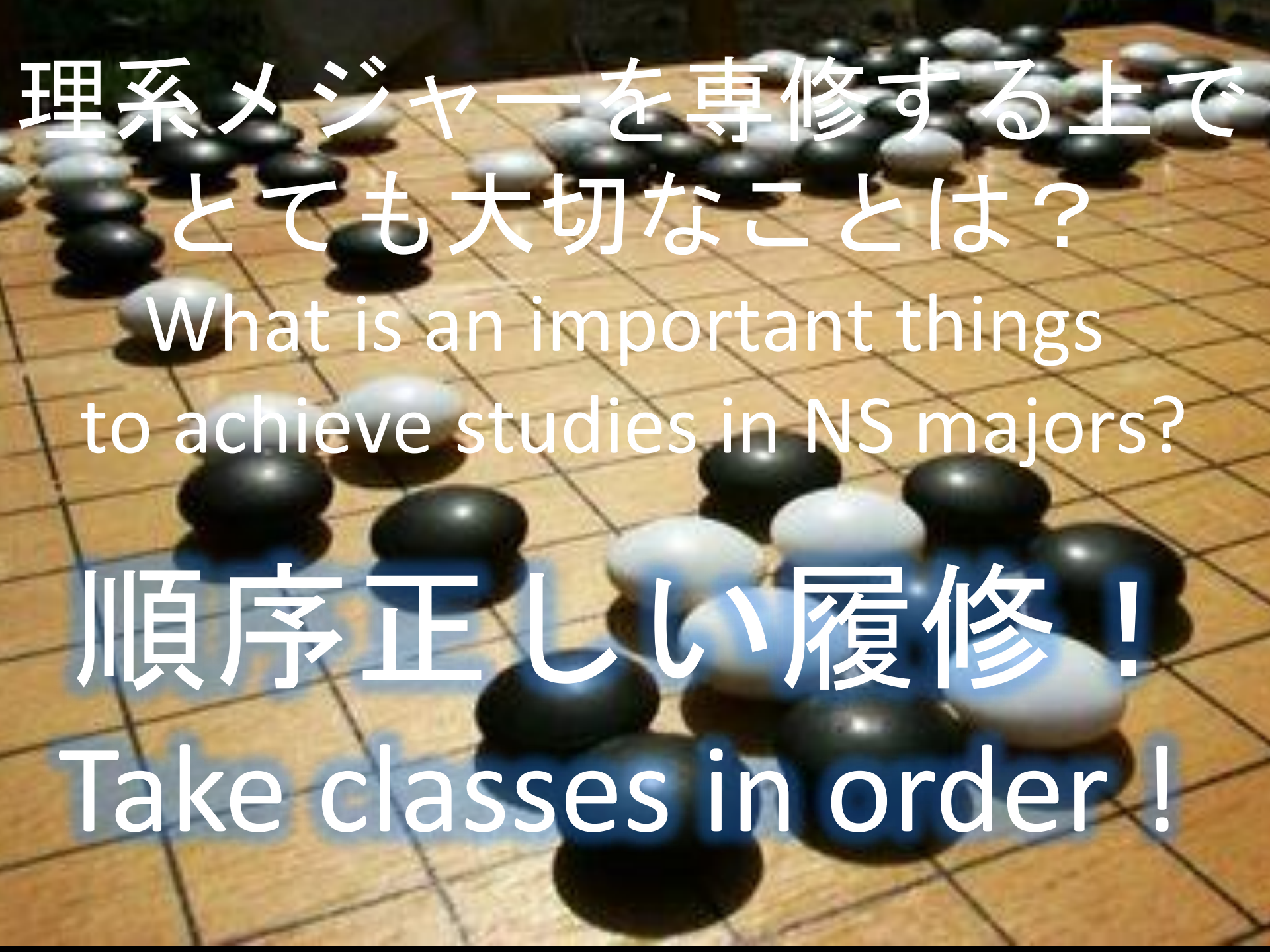
理学系教員のOffice、教室の場所などの問い合わせ先
How to find NS faculties or class room in Troyer AS Hall?

- T-kan Reception Office (T-148@1F central entrance)

Web Site for Natural Science Majors
https://office.icu.ac.jp/departments/science/

Contact major advisors for your learning (履修)

- 生物メジャー Biology : 上遠岳彦 T. Kamito, 早間良輔 R. Hayama, グホ, サビーヌ Sabine Gouraud
- 化学メジャー Chemistry : コウ, ジュリアン Julian Koe
- 情報科学メジャー Info Science : 石橋圭介 K. Ishibashi, 鏑木 崇史 T. Kaburagi, クティチネ マツ, アンドレア Andrea Kuticzne Matz
- 数学メジャー Mathematics : 清水勇二 Y. Shimizu, 山崎満 M. Yamazaki, 松村朝雄 T. Matsumura
- 物理学メジャー Physics : 岡野 健 K. Okano, 山崎歴舟 R. Yamazaki
- 環境研究メジャー Env.Studies : 藤沼良典 R. Fujinuma


理系メジャーを専修する上で
とても大切なことは？
What is an important things
to achieve studies in NS majors?
順序正しい履修！
Take classes in order !

Graduation requirement: major courses

In addition to、GE, PE, Language requirement

★Major courses are Foundation, Area Major, SrThesis and Electives.

基礎科目・専攻科目・卒業研究・選択科目

You need to complete the minimum number of units in each category (Elective varies according to Language Program.).

	Single Major	Double Major	Major /Minor
基礎科目 Foundation	18 units	18 units	18 units
	More than 6 units are necessary from the chosen major.	More than 6 units are necessary from each chosen major.	More than 6 units are necessary from the chosen major as well as the chosen minor.
専攻科目 Area Major	21 units	Total 51 units	Total 36 units
	From the major chosen	21 units from the major of senior thesis study	21 units from the chosen major
		30 units from the major without senior thesis study (including 9 units of major courses; you need to include at least 3 units of 300 courses.)	15 units from the chosen minor
卒業研究 Sr. thesis	9 units	9 units from the major of senior thesis study	9 units from the chosen major
選択科目 Electives	40 units	10 units	25 units

2022/April 自然科学系基礎科目履修ガイド

Apr. 1st/2022

Science Foundation Courses at ICU 自然科学系基礎科目

◎: Strongly Recommended ○: Recommended

Major	Course No.	U.	L.	Spring Term	Autumn term	Winter Term	M	IS	P	C	B
数学 [M] *Math.*	MTH102	3	J	数学入門(J開講)							
	MTH102	3	E		数学入門(E開講)						◎
	MTH101	3	J			微分積分学 I (J開講)	◎	◎	◎	◎	
	MTH101	3	E	微分積分学 I (E開講)*							
	MTH103	3	J		線形代数学 I (J開講)		◎	◎	◎	◎	○
	MTH103	3	E			線形代数学 I (E開講)					
	MTH105	2	J	最先端の数理科学			○				
情報科学 [IS] *Info.Sci.*	ISC103	3	E	コンピュータ基礎				◎			
	ISC104	3	E		プログラミング基礎		○	◎	○	◎	◎
	ISC106	2	J			情報科学実験		○			
	ISC101	2	J	情報倫理				○			
	ISC102	2	E			離散数学基礎 *					
物理学 [P] *Physics*	PHY106	2	J	最先端の物理学					◎		
	PHY102	2	E		初級物理学		○				
	PHY103	2	E			基礎物理学			◎	◎	◎
	PHY104	2	E			初級物理学実験			◎		
	PHY105	2	J	基礎物理学実験 *							
化学 [C] *Chemistry*	CHM104	2	J		化学入門						
	CHM101	2	J&E			化学概論			○	◎	◎
	CHM103	2	J	基礎化学 *						◎	
	CHM102	2	J	基礎化学実験 *						◎	◎
生物学 [B] *Biology*	BIO102	2	J	生物学入門							○
	BIO101	2	J&E			基礎生物学				◎	◎
	BIO103	2	J	基礎生物学実習 *							◎
	BIO104	2	E		基礎生化学 **					◎	◎

*: 2年次履修の基礎科目　　M: 数学、IS: 情報科学、P: 物理学、C:化学、B:生物学

**: 生物専修は2年次、化学専修は3年次履修の基礎科目

1) Right 5 columns show recommended courses to take in order to major in Math[M], Information Science[IS], Physics[P], Chemistry[C], Biology[B]. Choose the top mark of the major you are interested in, then follow vertically to check them.
◎: Strongly recommended (履修を強く勧める科目) ○: Recommended (履修が望ましい科目)

2) It is recommended to take a number (designated by circles) or more of courses in each framed box.

3) A course without a circle might become necessary depending on your learned subjects. Then consult a major advisor.

4) For Calculus I, you are supposed to have learned advanced Calculus at high school (数学III) or MTH102 Intro to Math. For those majors without ○ and ◎ in MTH102, if you have not learned advanced Calculus, you are strongly recommended to take MTH102 in Autumn term (in English) or in Spring term (in Japanese).

5) Foundation of computers is basically for first year students. It is offered in English but will be taught so that you can follow.

6) 6 units of foundation courses in the chosen major are required for graduation. It is better to take those early enough.

2022/April 自然科学系基礎科目履修ガイド

1. Select the interested major.

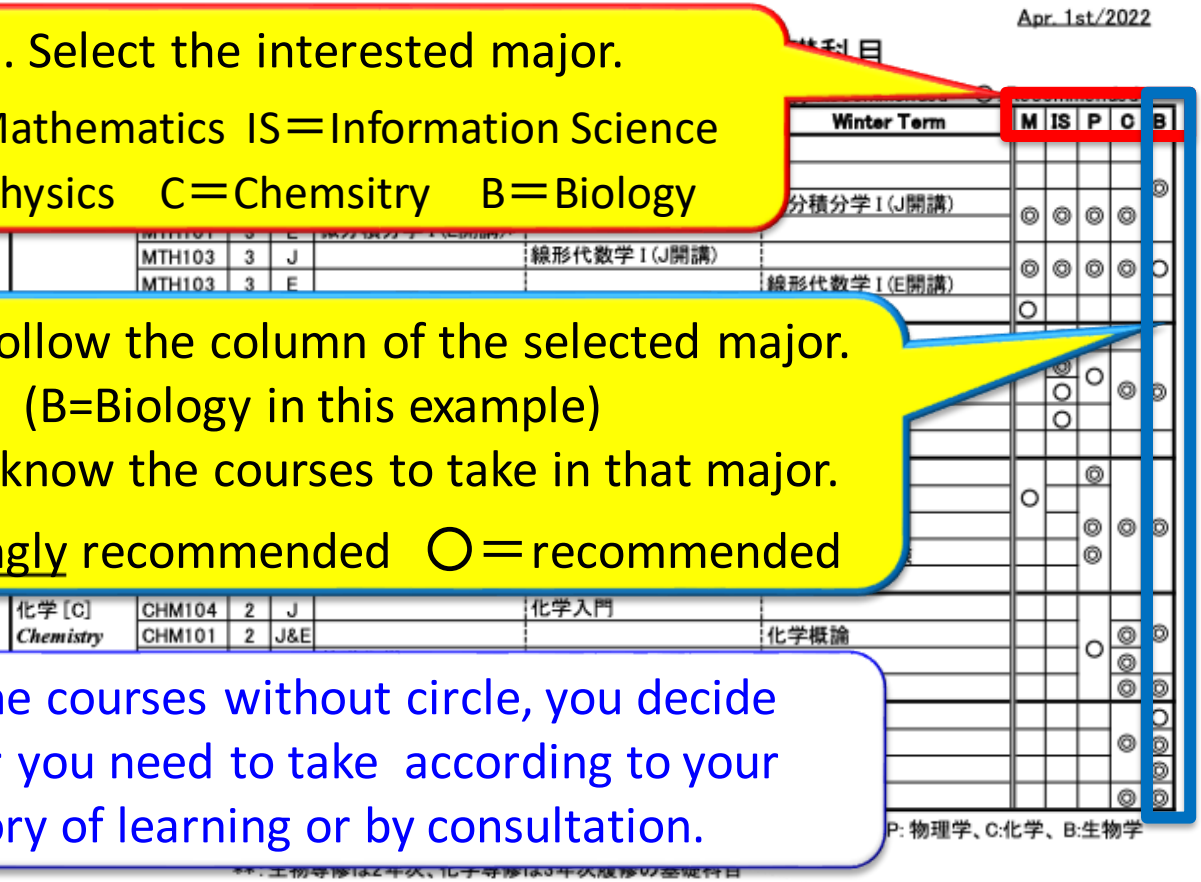
M＝Mathematics IS＝Information Science

P＝Physics C＝Chemsitry B＝Biology

2. Please follow the column of the selected major.
(B=Biology in this example)
Then you know the courses to take in that major.

◎＝Strongly recommended ○＝recommended

3. For the courses without circle, you decide whether you need to take according to your history of learning or by consultation.



1) Right 5 columns show recommended courses to take in order to major in Math[M], Information Science[IS], Physics[P], Chemistry[C], Biology[B]. Choose the top mark of the major you are interested in, then follow vertically to check them.
◎: Strongly recommended (履修を強く勧める科目) ○: Recommended (履修が望ましい科目)

2) It is recommended to take a number (designated by circles) or more of courses in each framed box.

3) A course without a circle might become necessary depending on your learned subjects. Then consult a major advisor.

4) For Calculus I, you are supposed to have learned advanced Calculus at high school (数学III) or MTH102 Intro to Math. For those majors without ○ and ◎ in MTH102, if you have not learned advanced Calculus, you are strongly recommended to take MTH102 in Autumn term (in English) or in Spring term (in Japanese).

5) Foundation of computers is basically for first year students. It is offered in English but will be taught so that you can follow.

6) 6 units of foundation courses in the chosen major are required for graduation. It is better to take those early enough.

General Education courses for Natural Science majors
自然科学系一般教育科目

For students in Natural Science majors, we strongly recommend

"History of Science" in Senior Winter

"Philosophy of Science" in Senior Spring

"Senior Integrated Seminar" in Senior Autumn

to take among General Education courses.

Major	Course No.	L.	科目名	Units	Term	Course Description	M	CS	P	C	B
数学 [M], 情報科学[CS], 物理学[P], 化学[C], 生物学[B}	GEN052	E	N2:科学史(3年次)	2単位	Winter	自然科学と数学の発展の歴史について学ぶ	◎	◎	◎	◎	◎
	GEN053	E	N2:科学哲学(4年次)	2単位	Spring	自然科学の本質に関わる哲学観について学ぶ	◎	◎	◎	◎	◎
	GEN041	J	N1:総合演習(4年次)	3単位	Autumn	一つの主題について、これまで学んできたことを生かして議論を行い、総合的な理解を深める	◎	◎	◎	◎	◎

These are not the courses to take immediately. But you need to take these GE by careful planning !

Special Measures for ELA stream 4 students
履修単位数上限の特別措置

Special Measures for academic planning
Students learning Fdn courses in Natural Science majors and in the first year ELA may increase the normal academic load by 1 unit under the following condition.

Normal academic load is 13 units(13+1/3 in case of taking PE exercise). Then students who learn the first year ELA can take up to 13+1/3 units. Those in ELA Stream 4 can only take up to 6+1/3 units in addition to ELA courses. However, when you want to take a Foundation course in Natural Science majors (Biology, Chemistry, Information Science, Mathematics, Physics, Environmental Study) in a term and your load is over 13+1/3 units, you might be allowed to take up to 14+1/3 units (7+1/3 units excluding ELA).
This special measures do not apply to those students in ELA Stream 4 who have completed the first year SEA program.

The above special measures are for the students who learn Foundation courses in Natural Science majors, since they are recommended to take these as early as possible and these courses are of 2 units or 3 units.
You need to apply for the measure at Educational Affairs Office. (cf. next page)

Application procedure for the special measures of one additional unit for students in ELA Stream 4

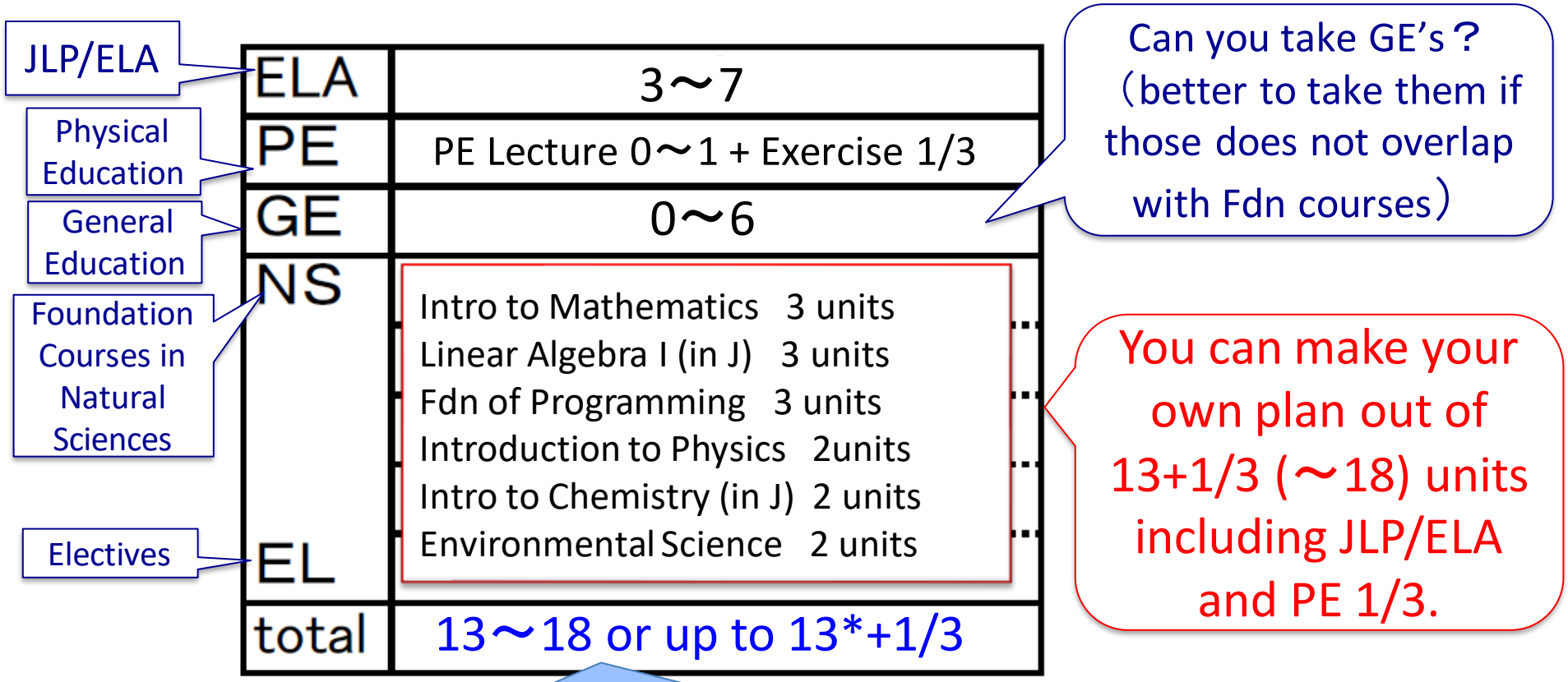
When you want to apply for it should follow the following:

1. On the registration days, you register up to 13+1/3 units (6+1/3 units excluding ELA) of courses except a Fdn course in Natural Science majors.
2. Until the end of registration change period, you send an email to Educational Affairs(EA) group (reg@icu.ac.jp) asking the registration of a Fdn course in Natural Science major which surpasses the limit.
3. EA group sends an email indicating the necessary procedure to you upon the request email.
4. Please follow the instruction, write the course which surpasses the limit and send it back to EA group.
5. EA group will register the course.
6. The registered result can be checked online only after the course cancellation period.

You can attend the course from the first class. Please tell the instructor that your registration will be reflected later.

Which plan do I make in this autumn term？

Normal academic load is 13(+1/3) units (max. 18 units)
(First year students in ELA： up to 13+1/3 including ELA)



＊： If you are in ELA Stream 4 and enroll in NS Fdn courses, you can take up to 14+1/3 by applying for the special measures.

How to read this booklet for course planning
履修計画の手引きの読み方

履修計画上役に立つ、
理系Majorの共通の説明と
履修計画の手引きを
どうやって読むかの
補足説明です。

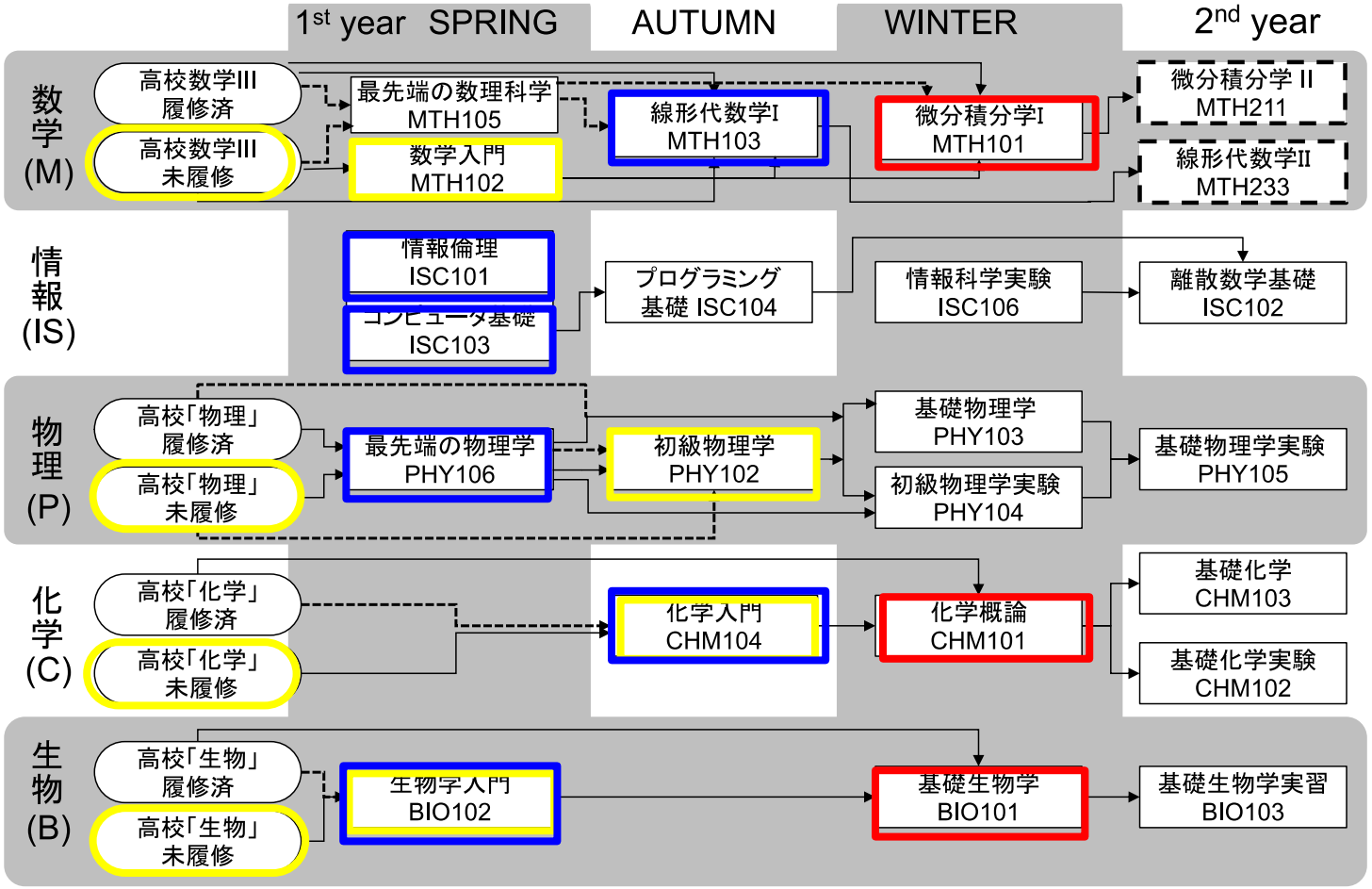
Common explanations
for Natural Science majors
that are useful for course planning.
&
Additional information on how to
read the course planning guide
booklet

基礎科目の履修の流れ

高校で履修していない教科がある場合→□

□は高校で既習または□を履修している必要がある

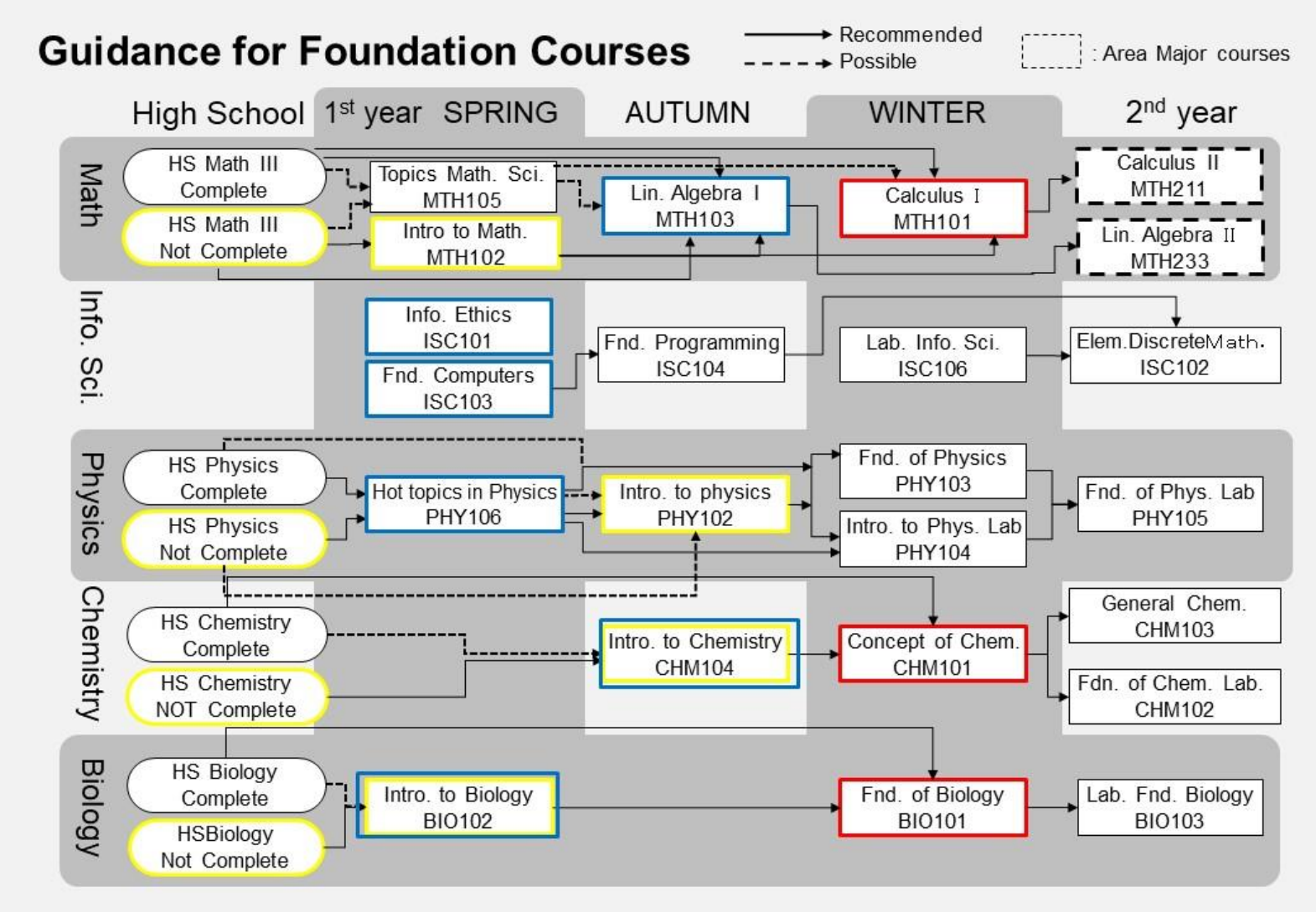
□はこれまでの既習状況によらない導入科目



Flow chart of NS Foundation courses

-- Recommended to take if you have not completed HS course

Start from [ ] if you have completed HS course ; [ ] -- Course not at HS



2023/September Natural Science Major Guidance

August 31st/2

Science Foundation Courses at ICU 自然科学系基礎科目

◎: Strongly Recommended ○: Recommended

Major	Course No.	U.	L.	Spring Term	Autumn term	Winter Term	M	IS	P	C	B
数学 [M] *Math.*	MTH102	3	J	Intro. to Math. (J)							◎
	MTH102	3	E		Intro. to Math (E)						
	MTH101	3	J			Calculus I (J)	◎	◎	◎	◎	
	MTH101	3	E	Calculus I (E)*							
	MTH103	3	J		Linear Algebra I (J)		◎	◎	◎	◎	○
	MTH103	3	E			Linear Algebra I (E)					
	MTH105	2	J	Hot topics in Math Se			○				
情報科学 [IS] *Info.Sci.*	ISC103	3	E	Fnd. of Computers			○	◎	○	◎	◎
	ISC104	3	E		Fnd. of Programming			◎			
	ISC106	2	J			Lab. in Info. Science		○			
	ISC101	2	J	Information Ethics				○			
	ISC102	2	E			Elemt. of Discrete Math.*					
物理学 [P] *Physics*	PHY106	2	J	Hot topics in Physics			○		◎	◎	◎
	PHY102	2	E		Intro. to Physics						
	PHY103	2	E			Fnd. of Physics			◎		
	PHY104	2	E			Intro. to Physics Lab.			◎		
	PHY105	2	J	Fnd. of Physics Lab.*							
化学 [C] *Chemistry*	CHM104	2	J		Intro. to Chemistry		○		○		◎
	CHM101	2	J&E			Concepts in Chemistry				◎	
	CHM103	2	J	General Chemistry *						◎	
	CHM102	2	J	Fnd. of Chem. Lab. *						◎	◎
生物学 [B] *Biology*	BIO102	2	J	Intro. to Biology							○
	BIO101	2	J&E			Fnd. of Biology				◎	◎
	BIO103	2	J	Lab. in Fnd. of Biolog							◎
	BIO104	2	E		Fnd. of Biochemistry **					◎	◎

＊: Recommended to be taken at the 2nd year.

＊＊: Recommended to be taken at the 2nd year for Biology Major, and the 3rd year for Chem

1) Right 5 columns shows "Recommended courses" of each major. Math[M], Info. Sci.[IS], Pysics [P], Chem [C] Biol [B]

◎: Strongly recommended ○: Recommended

2) You should choose more than the number of symbols from courses in a connected column.

3) It may be required to take courses without ○ or ◎ depending on what you have/have not taken in high school.
4) Prerequisite for Calculus I is advanced level Math. in high school or the Intro. to Math. (MTH102). It is strongly recommended to take the Introduction to Math. in the Spring Term if you have not taken the advanced level Mathematics.

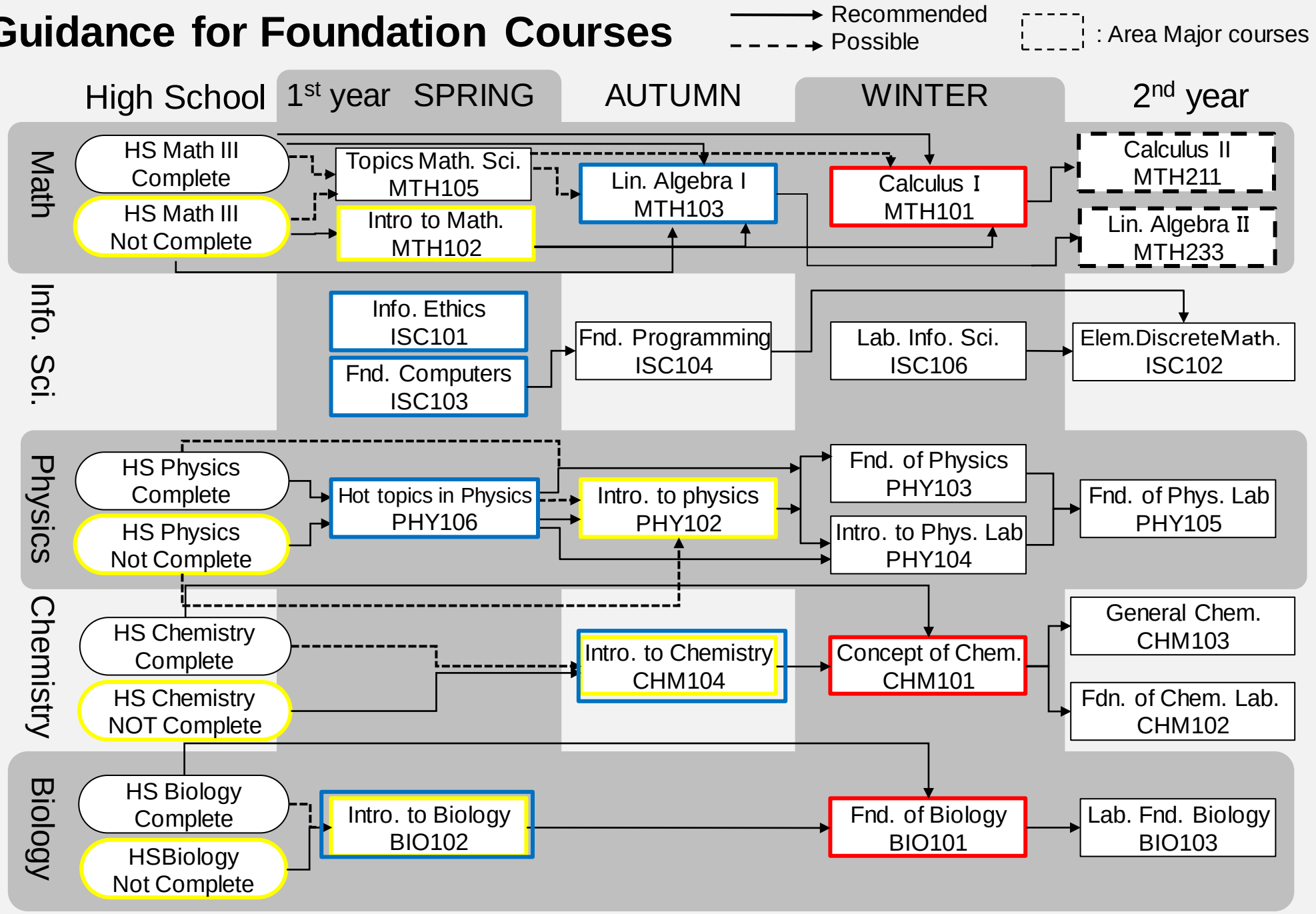
5) At least 6 units of foundation courses must be taken from students' chosen major. Students with a major/minor or a double major must be taken at least 6 units from each major and minor.

General Education Courses for Science Majors 自然科学系一般教育科

Three GE courses below are strongly recommended courses for Natural Science students.

Major	Course No.	U.	L.	Term	科目名	M	IS	P	C	B
Math., Info. Sci., Physics, Chem., Bio.	GEN052	2	E	Winter	N2:History of Science 科学史(3rd year)	◎	◎	◎	◎	◎
	GEN053	2	E	Spring	N2:Philosophy of Science 科学哲学(4th year)	◎	◎	◎	◎	◎
	GEN041	3	J	Autumn	N1:Senior Integrating seminar in Natural Sciences 自然科学総合演習(4th year)	◎	◎	◎	◎	◎

Guidance for Foundation Courses



Explanation of Foundation Course Flow Chart

The number of credits in the first year spring term is limited to average 13+1/3, but it varies depending on your Language Program. Those who are in ELA Stream 4, and take "Natural Science Foundation course" are allowed to take extra 1 unit beyond the limit. (Total 14+1/3)

Spring term

- **Mathematics**："Introduction to Mathematics (3 units)" is recommended for those who have not learned high school calculus (Mathematics III) or are not so confident in the subject. It is continued with "Calculus I" in winter. Note: **Hot Topics in Math. Sci**. is not offered in 2024.
- **Information Science**："Information Ethics (2 units)" Introduction to information literacy, including the copyright, security etc. The basic knowledge of this course is recommended to all students. "Foundation of Computers (3 units)" Introductory course for those who plan to major in Information Science, and all other students.
- **Physics**："**Hot topics in Physics** (2-units)" Introduction to Physics as a field of study. Knowledge of high school physics /math is not required so recommended to all students of first/second year.
- **Chemistry**：Not offered
- **Biology**："Introduction of Biology （2 units）" Knowledge of High school Biology is NOT required.

Autumn term

- **Mathematics**："Linear Algebra Ⅰ (3 units)" Strongly recommended to those students who plan to major in Mathematics, Physics, Information Science, Chemistry, or Biology. It is continued to "Linear Algebra II", "Topics in Linear Algebra" (Area Major courses) for sophomore students.
- **Information Science**："**Fnd. of Programming** (3 units)" Those students who have plan to major in Info. Science or have interest in programming.
- **Physics**："Introduction to physics (2-units)" Foundation of mechanics for students who have not finished physics course in high school. Knowledge of high school Math II is required. Linked to "**Introduction to physics laboratory (2-unitis)**" in winter term.
- **Chemistry**："Introduction to Chemistry (2 units)" Strongly recommended for those who have not taken chemistry or who have taken only a part of chemistry (e.g. Basic of Chemistry, Chemistry) at high school.
- **Biology**： "**Fnd. of Biochemistry**" is offered, however, this course is recommended to take at Sophomore year.

Winter term

- **Mathematics**："**Calculus I (3 units)**" For those who have learned high school calculus (Mathematics III) or "**Intro. to Math.**" Strongly recommended to those who plan to major in Math., Physics, Info. Science, or Chemistry.

- **Information Science**：**"Laboratory in Information Science (2 units)"** For all students who have interest in Information science.

- **Physics**："Foundation of physics (2-units)" Basics of electromagnetics. Basic knowledge of mechanics is required. Linked to "Foundation of physics laboratory (2-units)" in spring term in the second year. "Introduction to physics laboratory (2-unitis)" deals with mechanics and waves. It also teaches basic knowledge for experiments including scientific reports and error analysis. All the physics students are expected to take this course. Basic knowledge of mechanics and waves is required.

- **Chemistry**："Concepts in Chemistry (2 units)" Strongly recommended for those who have taken all the chemistry courses (e.g.e.g. Basic of Chemistry, Chemistry) at high school or those who have taken "**Introduction to Chemistry**" in the Autumn term. After taking this course, you can take "General Chemistry" and "Foundation of Chemistry Laboratory" in the Spring term of sophomore year.

- **Biology**："Fnd. of Biology （2 units）" Prerequisite: high school advanced Biology or Introduction to Biology.

English follows Japanese

2023/September 自然科学系基礎科目履修ガイド

August 31st/2

Science Foundation Courses at ICU 自然科学系基礎科目

◎: Strongly Recommended ○:Recommended

Major	Course No.	U.	L.	Spring Term	Autumn term	Winter Term	M	IS	P	C	B
数学 [M] *Math.*	MTH102	3	J	数学入門(J開講)							◎
	MTH102	3	E		数学入門(E開講)						
	MTH101	3	J			微分積分学 I (J開講)	◎	◎	◎	◎	
	MTH101	3	E	微分積分学 I (E開講)							
	MTH103	3	J		線形代数学 I (J開講)		◎	◎	◎	◎	○
	MTH103	3	E			線形代数学 I (E開講)					
	MTH105	2	J	最先端の数理科学			○				
情報科学 [IS] *Info.Sci.*	ISC103	3	E	コンピュータ基礎			○	◎	○	◎	◎
	ISC104	3	E		プログラミング基礎			◎			
	ISC106	2	J			情報科学実験		○			
	ISC101	2	J	情報倫理				○			
	ISC102	2	E			離散数学基礎＊					
物理学 [P] *Physics*	PHY106	2	J	最先端の物理学			○		◎	◎	◎
	PHY102	2	E		初級物理学						
	PHY103	2	E			基礎物理学			◎		
	PHY104	2	E			初級物理学実験			◎		
	PHY105	2	J	基礎物理学実験＊							
化学 [C] *Chemistry*	CHM104	2	J		化学入門				○	◎	◎
	CHM101	2	J&E			化学概論					
	CHM103	2	J	基礎化学＊						◎	
	CHM102	2	J	基礎化学実験＊						◎	◎
生物学 [B] *Biology*	BIO102	2	J	生物学入門							○
	BIO101	2	J&E			基礎生物学				◎	◎
	BIO103	2	J	基礎生物学実習＊							◎
	BIO104	2	E		基礎生化学 **					◎	◎

＊:2年次履修の基礎科目　　M: 数学、IS:情報科学、P: 物理学、C:化学、B:生物

**:生物専修は2年次、化学専修は3年次履修の基礎科目

1) 右端の５列は、数学[M], 情報科学[IS], 物理学[P], 化学[C], 生物学[B] の各分野を専修する上で、履修最上列の記号から興味のあるメジャーを選び, 縦にたどればそのメジャーの勧める科目がわかる.
◎:履修を強く勧める科目 (Strongly recommended)　○ : 履修が望ましい科目(Recommended)

2) 複数にわたる場合は、それらの科目から丸印の個数以上の科目を選択して履修することが望ましいことを示す

3) 丸印が付いていない科目でも、高校での学習状況などによって履修が必要となる場合があるので、教員に相談すること

4) 冬学期の**微分積分学 I**は、高校の数学III,または 数学入門 の既習を前提としている.
数学入門に○または◎印が付いていない分野でも、数学IIIを履修していない学生は、春学期に数学入門の履修を強く勧める
英語開講科目を希望する場合は秋学期の数学入門の方を履修することも可能である。

5) **コンピュータ基礎** は１年生向けの科目。教授言語が Ｅ でめるが1年生の英語力でもついてこられるよう配慮する

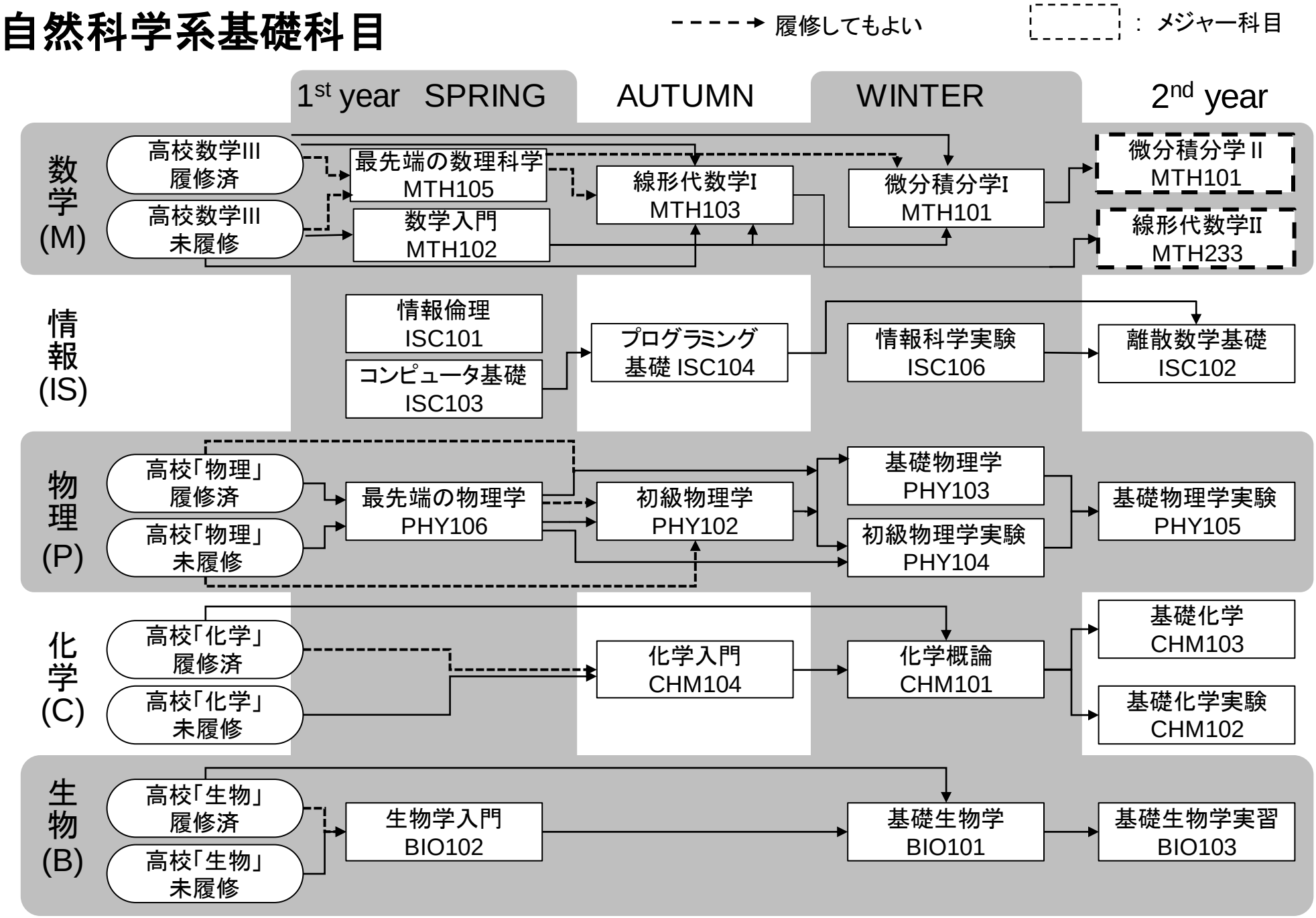
6) 基礎科目は、専修分野内から最低6単位の履修が卒業要件である。早めの履修を勧める

General Education Courses for Science Majors 自然科学系一般教育科

以下の一般教育科目は3、4年次向けであるが、理系メジャーを専修する学生には将来履修することを強く勧める。一般教育科目の履修においては、このことを念頭に入れて計画を立てるように。

Major	Course No.	U.	L.	Term	科目名	M	IS	P	C	B
Math., Info. Sci., Physics, Chem., Bio.	GEN052	2	E	Winter	N2:History of Science 科学史(3rd year)	◎	◎	◎	◎	◎
	GEN053	2	E	Spring	N2:Philosophy of Science 科学哲学(4th year)	◎	◎	◎	◎	◎
	GEN041	3	J	Autumn	N1:Senior Integrating seminar in Natural Sciences 自然科学総合演習(4th year)	◎	◎	◎	◎	◎

自然科学系基礎科目


履修してもよい
: メジャー科目
1st year SPRING
AUTUMN
WINTER
2nd year
数学 (M)
高校数学III 履修済
高校数学III 未履修
最先端の数理科学 MTH105
数学入門 MTH102
線形代数学I MTH103
微分積分学I MTH101
微分積分学 II MTH101
線形代数学II MTH233
情報 (IS)
情報倫理 ISC101
コンピュータ基礎 ISC103
プログラミング基礎 ISC104
情報科学実験 ISC106
離散数学基礎 ISC102
物理 (P)
高校「物理」 履修済
高校「物理」 未履修
最先端の物理学 PHY106
初級物理学 PHY102
基礎物理学 PHY103
初級物理学実験 PHY104
基礎物理学実験 PHY105
化学 (C)
高校「化学」 履修済
高校「化学」 未履修
化学入門 CHM104
化学概論 CHM101
基礎化学 CHM103
基礎化学実験 CHM102
生物 (B)
高校「生物」 履修済
高校「生物」 未履修
生物学入門 BIO102
基礎生物学 BIO101
基礎生物学実習 BIO103

理系基礎科目　フローチャート補足: 学期別

1 年次春学期の履修単位 = 13+1/3 単位（理系基礎科目を履修する場合）
ただし、ELA Stream4 で 理系基礎科目を履修する場合は、別途申請によって、もう 1 単位多く 14+1/3 単位まで履修出来る。

1 年次春学期

- **数学** ：「**数学入門**（3 単位)」高校で数学 III を履修していない学生、または履修したけれど自信のない学生に履修することを勧める。冬学期の「**微分積分学 I**」につながる.「**最先端の数理科学**」は、2024 年度は開講しない。
- **情報** ：「**情報倫理（2 単位)**」情報リテラシーの入門(著作権、セキュリティ等を含む). 情報科学メジャー希望の学生も、そうでない学生も身につけるべき一般的・基本的な知識と考え方を紹介する内容であり、その後の情報科学メジャーのコースを履修する上で、土台となり、結びつくような必須科目ではない.
「**コンピュータ基礎（3 単位)**」主に情報を専修する予定の学生向けだが、それ以外の学生も履修できる.
- **物理** ：「**最先端の物理学（2 単位)**」学問としての物理学の紹介. 平易な数学は用いるが，高校の物理・数学の履修は前提とせず、予備知識を必要としない. すべての学生向け. 1 年次でも 2 年次でも履修可.
- **化学** ：開講基礎科目無し
- **生物** ：「**生物学入門　（2 単位)**」高校の生物科目の既修を前提としない. 大学の生物学の入門コース.

1 年次秋学期

- **数学** ：「**線形代数学 I （3 単位)**」数学、物理、情報科学、化学、生物をメジャーとする予定の学生に履修することを強く勧める. 2 年次の「**線形代数学 II**」に続く.
- **情報** ：「**プログラミング基礎（3 単位)**」情報科学メジャー予定者またはプログラミングに興味のある学生向け.
- **物理** ：「**初級物理学（2 単位)**」 力学の基礎. 高校の物理、数学 III の履修は前提としない. 対応する実験は冬学期の「**初級物理学実験（2 単位)**」.
- **化学**：「**化学入門（2 単位)**」高校で化学を履修していないまたは高校の”化学基礎”しか履修していない学生に履修することを勧める.
- **生物**：「**基礎生化学(2 単位)**」が開講されるが、これは原則として 2 年次に履修する.

1 年次冬学期

- **数学**：「**微分積分学 I（3 単位)**」高校で数学 III を履修または「**数学入門**」を履修した学生向け. 数学、物理、情報科学、化学をメジャーとする予定の学生には、履修することを強く勧める.
- **情報**：「**情報科学実験（2 単位)**」 興味のある人はだれでも可.
- **物理**：「**基礎物理学（2 単位)**」 電磁気学の基礎. 高校の物理、数学 III の履修は前提としないが，高校物理または秋学期の「**初級物理学**」の既習が望ましい. 対応する実験は 2 年次春学期の「**基礎物理学実験（2 単位)**」,
「**初級物理学実験(2 単位)**」主に力学・波動に関連した実験. 秋学期に「**初級物理学(2 単位)**」を先に履修することが望ましい.
- **化学**：「**化学概論（2 単位)**」高校で「化学」または秋学期に「**化学入門**」を履修した学生向け. 化学をメジャーとする予定の学生には強く勧める.2 年次春学期開講の「**基礎化学**」、「**基礎化学実験**」に続く.
- **生物**：「**基礎生物学（2 単位)**」高校「生物」、または春学期に「**生物学入門**」を履修した学生向け.
生物をメジャー、またはマイナーとする予定の学生は、これを履修することを強く勧める

各メジャーの履修案内

Course guide for each Major

1. Biology
2. Chemistry
3. Information Science
4. Mathematics
5. Physics
6. Environmental Studies

Biology

Faculty Members

溝口剛 教授
Prof.
T. Mizoguchi

Plant Physiology
Plant circadian rhythm

布柴達男 教授
Prof.
T. Nunoshiba
Molecular Genetics in Microbes,
Genetic Toxicology

小瀬博之 教授
Prof. H. Kose
Developmental Biology

グホ・サビン准教授
Asoc. Prof.
Sabine Gouraud S.S.
Cell Biology
Blood pressure regulation

Major Advisor
上遠岳彦 准教授
Asoc. Prof.
T. Kamito
Animal Ecology

Major Advisor
早間良輔 准教授
Asoc. Prof.
Ryosuke Hayama
Environmental responses of plant

Bio Major
Moodle Page

小林牧人 特任教授
Prof.
M. Kobayashi
Animal Physiology
Reproductive Biology

Biology Model Schedule for 2023 September Students

Aug.31st, 2023

Year		Term	JLP	PE	GE	$	Foundation	units	$	Major	units	$	Elective	units	Total
2023	Fr.	A	3～6	1+ 1/3	3	#9	(Lin. Alge. I (J))	3							13+1/3
						#8	Intro. Calculus (E)	3							
						#4	**Intro. Chem**	2							
						#5	Intro.Physics	2							
		W	3～6	1+ 1/3	3	#1	**Fnd of Biology (J&E**	2				#7	Lab. Comp. Sci.	2	13+1/3
						#6	Intro Phys Lab	2				#5	Fnd Phys	2	
						#8	Calculus	3							
						#4	**Concepts Chem**	2							
						#9	Lin. Alge. I (E)	3							
2024		S		1/3	3	#3	**Lab. Fnd Bio**	2	#10	**BC Genetics**	2	#4	General Chem.	2	13+1/3
							Intro. Biol.	2	#10	**BC Cell Biol**	2	#5	Hot Topics Physics	2	
						#6	Fnd. Chem. Lab	2				#6	Fnd Phys Lab	2	
						#8	**Intro. Calculus (J)**	3							
						#7	Info. Ethics	2							
	So.	A		(1/3)	3	#2	**Fnd Biochem (E)**	2	#11	**Lab. in Biology**	2		(Exp. in Chem.)	2	13~15 (+1/3)
									#10	**BC Plant Phys**	2				
										Cell Dynamics	2				
										Field Study Biol #Sum	1				
		W		(1/3	3				#10	**BC Animal Develop.**	2		(Organic Chem. I)	**2**	13~15 (+1/3)
2025		S		(1/3	3					**Biostatistics**	2		(Org. Chem.Lab.)	2	13~15 (+1/3)
										Animal Dev. Biol.	2		(Organic Chem. II)	2	
										Plant Phys	2				
									#12	**Lab. Ani. Dev.**	2				
									#12	**Lab Mol. Genet. #Spr**	2				
	Jr.	A			3					**Ani. Physiology I**	2		(Organic Chem. III)	2	13~15
										Animal Biology	2				
										Microbiology	2				
									#12	**Lab. Ani. Physiology**	2				
									#12	**Lab. Biochem. I #Sum**	2				
									#12	**Lab. Plant Physiol. #Su**	2				
										Adv. Sem. II	2				
		W			2					**Ecology**	2				13~15
										Ani. Physiology II	2				
				(HistrySci)						**Neurobiology**	2				
										Plant Development	2				
										Biochemistry	2				
									#12	**Lab Microb. Genetics.**	3				
										Adv. Sem. III	2				
2026		S			2					**Adv. Sem. I**	2				13~15
				(PhilosSci)											
	Sr.	A			2 SIS					**Adv. Std. II**	2				
										Sr. Thesis	3				
		W								**Sr. Thesis**	3				
		S								**Adv. Std. I**	3				
										Sr. Thesis	2				
			(8)	2～4	15～27		MajorFdn 6 + 12			Area Major 30 + Sr. Thesis 9			18～38		136

BOLD Course title: Offered as Biology Major Courses.

#Spr,#Sum,#Aut : Offer during Spring, Summer or Autumn recess.

: Stromgly recommended Biology courses

◎Strongly recommended courses for the Biology Major students. (Column $)

A: Foundation Courses

#1. Fnd. of Biology Offered both E and J course

#2. Fnd. of Biochemistry

#3. Lab. Fnd, Biology

#4. At least one of three introductory chemistry lecture course.
(Intro. Chem, Concepts Chem, General Chem.)
(Intro. Chem, and Concepts Chem, are co-listed as the Biology MajorFoundation Course.)

#5. At least one of three introductory physics lecture course.
(Hot Topics Physics, Intro. Physics, Fnd Physics)

#6. At least one Found. Lab. courses from Chem. or Phys.
(Fnd. of Chemistry Lab. , Intro. Physics Lab. , Fnd. of Physics Lab.)

#7. At least one Found. courses from Information Science.(Info. Ethics,Lab. Info. Sci.)

#8. At least one Calculus course. (CalculusI or Intro. Calculus)

#9. Linear Algebra I (Autmn term in Japanese , Winter term in English. Either cource uses an English text book.)

B: Area Major Courses

#10. Four "Basic Concepts Biology" courses

#11. Lab. in Biology

#12. At least 3 Biology Laboratory courses

◎Strongly recommended courses for the Biology Minor students. (Column $)

#10. At least three courses out of four "B.C. XXX" Biology courses.

#11. Lab. in Biology

#12. At least one Biology Laboratory courses

◎ Major declaration requirements :

Foundation of Biology or **Introduction to Biology**

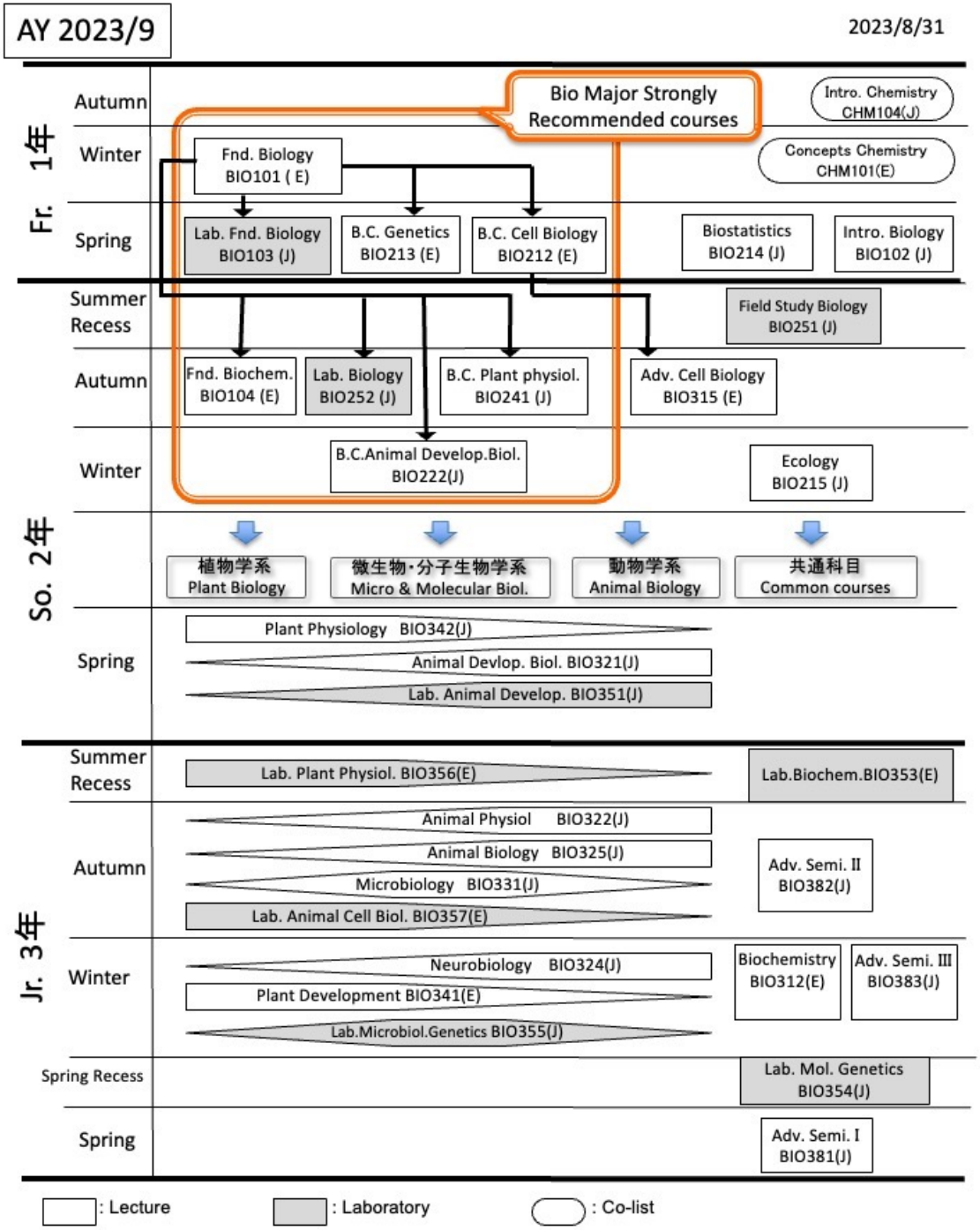
◎ Area major requirements :

Foundation

	Sr.thesis Major	(2nd) Major	Minor	Non-major	elective
Single Major	6			12	
Double Major	6	6		6	
Major Minor	6		6	6	

Area Major

	Sr.thesis Major	(2nd) Major	Minor	Non-major	elective
Single Major	21				41
Double Major	21	30			11
Major Minor	21		15		26



Four-year Course flow

Legend

:Biology Major Courses

:Laboratory courses

:Related non-Biology major courses

*****学 BIO***(J)

The bolded part of the diagram is the subject you should take if you want to study the category directly above.

The narrower part of the diagram is for subjects that you can take at your convenience when learning the category directly above.

These categories do **NOT** mean that you must choose any one category.

Biology Courses (2023)

: Strongly Recommended courses for Biology Major students.

Revised August 31/2023

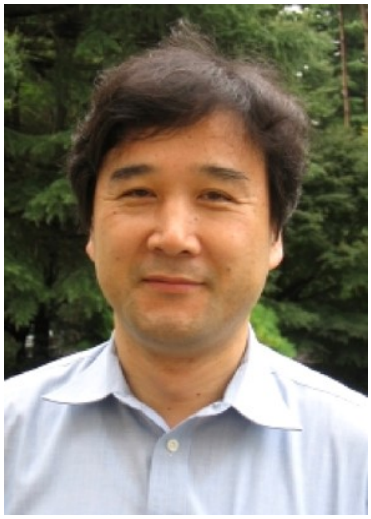
Course Number		Title	Unit	Term	Lang.	Course Description	Remarks
BIO	101	Foundation of Biology 基礎生物学	2	W	J&E	Basic concepts in microbiology, plant biology and animal biology will be introduced as a team-taught course. There will be strong emphasis on text book reading and assignment work. 微生物・植物・動物についての生物学的基本概念を教授する。教科書の精読による内容理解と、課題完成に力点を置いた指導を行う。	The course assumes preliminary knowledge equivalent to high school biology. 高等学校での「生物」履修程度の知識を前提とする。
BIO	102	Introduction to Biology 生物学入門	2	S	J	To learn about the fundamental properties of life. The roll of cell, expression system of genetic information, evolution and biodiversity are presented. The content of lecture is not premised on the completion of high school biology. 生命現象を支える基本的単位としての細胞、遺伝のシステムなどのミクロの領域、および、生物の進化と生物多様性などのマクロの領域について、実例を交えながら学ぶ。入門レベルの内容で、身近な私たちの体や生活、或いは社会との関わりを意識した内容。	The content of lecture is not premised on the completion of high school biology 高校「生物」の既修を前提としない。
BIO	103	Lab. in Foundation of Biol. 基礎生物学実習	2	S	J	Various basic experiments on life phenomenon. Microscopic observation, Field observation and various experiments on plant and animal structure, function or behavior. 顕微鏡を用いた観察、植物、動物の構造や機能、行動に関する実験、野外の動植物の観察等、生物学の基礎的な各種の実験	
BIO	104	Foundation of Biochemistry 基礎生化学	2	A	E	To study chemical basis of life. Introduction to the chemical nature and biological properties of low-molecular-weight substances and biopolymers as well as the biochemistry of basic cellular metabolism. 生命の化学的基礎について学ぶ。低分子物質及び生体高分子の化学的性質と生物学特性ならびに基本的細胞代謝の生化学の概論。	
BIO	212	Basic Concepts in Cell Biology 細胞生物学概論	2	S	E	The basic components of the cell are presented, including the plasma membrane, mitochondria, chloroplasts, the nucleus and the endomembrane system. There is a strong emphasis on function. 細胞の基本的な構成要素である、細胞膜、ミトコンドリア、葉緑体、核とそれらをつなぐ Endomembrane systemについて学ぶ。特にそれぞれの機能に焦点を当てる。	Recommended to be taken after BIO101 or 102. BIO101 または 102 の既修が望ましい。
BIO	213	Basic Concepts in Genetics 遺伝学概論	2	S	E	Genes are the basic replicating feature of living organisms. Already there is a substantial amount known about genes and complex mechanisms by which genetic information is expressed and regulated. During the development of the field of Molecular Biology, the techniques for examining the fine structure ofgenetic elements (genes) have established. Such techniques are now helping us gaining a clear understanding of life. 生命体共通の特徴であり、同時に、生命体の基本になっている遺伝現象について、基本的な遺伝法則の発見からの流れをたどりながら今日の分子生物学までを、遺伝子の実体、遺伝情報の発現・調節機構、等について、学習・考察する。	
BIO	214	Biostatistics 生物統計学	2	S	J	Study of the basic concepts of biostatistics and the fundamental statistical methods used to analyze experimental data. 生物学データの処理と文献理解に必要な統計学の一般理論, 実験計画法の基本に関する講義と若干の演習を行なう。	
BIO	215	Ecology 生態学	2	W	J	General and basic concepts (theories) and methods of ecological studies. 生態学の一般的, 基礎的な理論と技術等。	
BIO	222	Basic Conc. in Animal Develop. Biol. 動物発生生物学概論	2	W	J	Basic process and mechanism of development including growth, differentiation and morphogenesis in animals. Genetic basis of development in animals is also presented. 動物の発生における成長、分化、形態形成の基本的過程とそのメカニズム。動物の発生を制御する遺伝子の働きについて学ぶ。	
BIO	241	Basic Conc. in Plant Physiology 植物生理学概論	2	A	J	Basic concepts of plant physiology, especially focusing on photosynthesis and plant growth and development. 光合成, 植物の発生・成長など, 基本的な植物生理学の概念を理解する.	Recommended to be taken after BIO101 or 102. BIO 101 または 102 の既修が望ましい。
BIO	251	Field Study in Biology 生物学野外実習	2	A	J	Through field observations in the field, classifications, anatomy and ecological relations of plants, insects or mammals are studied. 本学キャンパス、及び東京近郊のフィールドでの野外観察を通して、植物、昆虫、鳥類等の形態、行動、生物間の生態的な関わりを学ぶ。	No prior knowledge required 履修の前提となる知識は必要としない
BIO	252	Laboratory in Biology 生物学実習	2	A	J	Fundamental experiments on biological materials using basic techniques for biochemical experiments. タンパク質、核酸等の生体構成成分に関する基礎実験を通して、生体構成成分の性質、取り扱いと、一般的な実験手法を身につける。	Recommended to be taken after BIO 103 BIO103基礎生物学実習の既修が望ましい。
BIO	312	Biochemistry 生化学	2	W	E	Nitrogen cycle in the biosphere, biological nitrogen fixation, biosynthesis and catabolism of amino acids, proteins, nucleic acids, porphyrins, etc. 生物圏における窒素循環, 生物による窒素固定, アミノ酸, タンパク質, 核酸, ポルフィリン類の生合成と分解。	Recommended to be taken after BIO 104 BIO 104 基礎生化学との既修が望ましい。
BIO	315	Advanced Cell Biology 細胞生物学	2	A	E	This course focuses on the functions of the animal cell integrated into a tissue. This course will cover Cell-to-Cell Junction, Cell-Cell Communication, Cell Signaling Pathways, Cell Division and Cell Death. The regulation of these processes will be discussed. 組織を形成する動物細胞の機能について学習する。特に細胞間接合、細胞間コミュニケーション、細胞シグナル伝達経路、細胞分裂、および細胞死に力点を置く。これらのプロセスの制御機構についてもとりあげる。	Recommended to be taken after BIO103 and 212 BIO103, BIO212の既修が望ましい。
BIO	321	Animal Developmental Biology 動物発生生物学	2	S	J	Cellular and molecular mechanisms of morphogenesis and pattern formation in animal development, and evolutionary aspects. 主として動物の発生における形作りやパターン形成のメカニズム、また最近の生物学分野で用いられている手法についてもを学ぶ。	

: 2023年度は開講されません。Not offered in AY2023

Course Number	Title	Unit	Term	Lang.	Course Description	Remarks
BIO 322	Animal Physiology 動物生理学	2	A	J	Animal structure,function, digestive system, respiratory system, osmoregulation, excretory system, endocrine system, and reproduction. 動物の形態と機能、消化吸収、呼吸、浸透圧、排出、内分泌、生殖などについて学ぶ。	No prior knowledge required 履修の前提となる知識は必要としない
BIO 323	Human Physiology 人体生理学	2	W	E	This course introduces students to the function and regulation of the human body. The physiological integration of the organ systems to maintain homeostasis will also be discussed. 人体の機能と調節について学習する。恒常性を維持するための臓器系の生理学的統合についてもとりあげる。	Recommend. to be taken after BIO 212 and 315. BIO212, 315 の既習が望ましい
BIO 324	Neurobiology 神経生物学	2	A	J	Basic cell physiology focusing on the physiological properties of the cell membrane and the physiology of the neuron. 細胞生理学の基礎を、細胞膜の生理学的性質とニューロンの生理学を中心に学ぶ。	
BIO 325	Animal Biology 動物学	2	A	J	Living organisms show diversity from body structure to behavior. To understand the diversity, symbiotic relationship is a key concept. This course deals with diverse animal body structure, metamorphosis or related life history from the viewpoint of symbiotic relationship. 生物は、発生・成長の過程、体の構造、そして行動まで、実に多様な形質を示す。この多様性を解き明かすキーワードとして「共生」の概念を中心に据え、動物の体の構造と変態の機構、及び生態について学ぶ。	Recommended to be taken after BIO101 or 102. BIO101 基礎生物学 または、102 生物学入門の既修が望ましい。
BIO 331	Microbiology 微生物学	2	A	J	Principles of evolution can provide an overarching theme to the course. The DNA replication, transcription, translation, cellular structures, metabolic pathways, regulatory signals, and genetic exchange mechanisms exhibited by microorganisms at present are the products of natural selection. In addition, evolutionary processes can be observed in the microbial world today, in cases such as antibiotic resistance, xenobiotic biodegradation, and the coevolution of hosts and pathogens. 進化の原理は本科目の全体を通した主題である。現在の原核生物に見られるDNA複製、転写、翻訳、細胞構造、代謝経路、制御要因や遺伝子水平伝達機構等は自然選択の結果である。更に、今日の微生物界では薬剤耐性、人工化学物質の生分解、宿主と病原菌の共進化等の現象に現在も進化過程が見られる。	Recommended to be taken after BIO101, 104 and 213. BIO101基礎生物学、104基礎生化学、213遺伝学概論の既修が望ましい。
BIO 342	Plant Physiology 植物生理学	2	S	J	Plant growth and development, and their regulation mechanisms controlled by genes, environmental factors and plant hormones. 植物の発生・成長・分化の制御について，遺伝情報，環境因子，ホルモン等による調節機構を学ぶ。	Recommended to be taken after BIO101 or 102 BIO101 または102 の既修が望ましい。
BIO 351	Lab. in Animal Development 動物発生学実習	2	S	J	Preparation and observation of tissue samples of chick embryos. Experiments on regulation of planarian regeneration. ニワトリ胚の標本作製と観察。プラナリアの再生実験。	
BIO 353	Laboratory in Biochemistry 生化学実習	2	A	E	Experiments on the metabolism of carbohydrates and lipids. Isolation of related enzymes and their reactions. 炭水化物・肪質の合成・代謝及び，酸素的反応速度論に関する実験。	
BIO 354	Lab. in Molecular Genetics 分子遺伝学実習	2	S	J	Understanding of basic and molecular genetics aspect using microorganism and Drosophila melanogaster. 微生物とキイロショウジョウバエなどを用いた分子遺伝学的実験手法により、実態としての遺伝子と基本的遺伝法則の確認を目指す。	Recommend. to be taken after BIO104,212,213, 252. BIO104 、213 、212 、252 の既修が望ましい。
BIO 355	Lab. in Microbial Genetics 微生物遺伝学実習	3	W	J	This lab course focuses on the investigative nature of microbiology to promote understanding of various biological systems in microbes, such as responses to environmental changes and stresses, through experiments using microbial cells, bacteriophages, DNA, and essential techniques such as asepsis. 微生物細胞、バクテリオファージやDNA、そして無菌操作などの手法を用いた実験により、生育環境変化に伴う遺伝子発現の変化やDNAの障害に対する防御の 仕組みなどの生命現象の分子機構について理解を目指す。	Recommended to be taken after BIO 101, 103, 331 and 252. BIO101基礎生物学、103遺伝学概論、331微生物学、252生物学実習の既修が望ましい
BIO 356	Lab. in Plant Physiology 植物生理学実習	2	A	E	Experiments on photosynthesis, water relationships, regulatory mechanisms of plant growth and development. 光合成，水分整理，植物の発生および成長における制御機構等についての実験。	
BIO 357	Lab. in Animal Cell Biology 動物細胞生物学実習	2	A	E	Students learn basic knowledge and techniques used in animal cell biology. 動物細胞生物学の実習を通して知識を学び、基本的な実験手法を身につける。	Recommend. to be taken after BIO103,212,213,and 315. BIO103,212,213,315の既習が望ましい
BIO 381, 2, 3	Advanced Seminar in Biology Ⅰ & Ⅱ & Ⅲ 生物学特別演習Ⅰ & Ⅱ & Ⅲ	2	S,A,W	J or E	Independent study of topics of special interest and value to the student in his/her major field. Language of instruction differs by section. 生物学に関する専門的な内容を学ぶ。内容は担当教員により決定される。セクションにより、開講言語が異なる。	Permission of the instructor is required. 担当教員の受講許可を要する。
BIO 384, 5	Advanced Studies in Biology Ⅰ & Ⅱ 生命科学特論Ⅰ & Ⅱ	2	S,A	J or E	Students will study how biological research is conducted by reading original research papers. Language of instruction differs by section. 生物学の研究がどのように行われるかについて、研究論文を題材として学ぶ。セクションにより、開講言語が異なる。	This course is mainly for senior thesis students 主に卒業研究の学生を対象にしたコース

Chemistry

化学メジャー
専任教員



Prof. Kenya KUBO
久保 謙哉 教授
(Radiochemistry/ 放射化学)

Prof. Julian R. Koe
ジュリアン コウ 教授
(Inorganic Chemistry/
無機化学)

Major advisor

Prof. Wang-Jae CHUN
田 旺帝 教授
(Physical Chemistry/
物理化学)

Sr. Assoc. Prof.
Junji KOBAYASHI
小林 潤司
上級准教授
(Organic Chemistry/
有機化学)

Sr. Assoc. Prof.
Chika MINEJIMA
峰島 知芳
上級准教授
(Analytical Chemistry/
分析化学)

Chem Courses

	Course Number	Title	Units	Term	Course Description :【Key Words】	Remark
Fdn	CHM101 E	化学概論 *Concepts in Chemistry*	2	W	Origin and occurrence of the chemical elements, atomic structure and the periodic table. Atomic approach to the structure of materials and fundamental properties of inorganic and organic compounds.	
	CHM102 E	基礎化学実験 *Foundation of Chemistry Laboratory*	2	S	To acquire the basic concepts of chemistry, experimental techniques, and customs required to carry out chemistry experiments, through selected experiments from Organic, Analytical, Inorganic, and Physical Chemistry.	
	CHM103 J	基礎化学 *General Chemistry*	2	S	This course deals with the ideas of chemical bonds, molecular structure and molecular orbitals to understand chemical reactions and chemical kinetics, concerning the change of matter and energy, chemical thermodynamics and electrochemistry.	
	CHM104 J	化学入門 *Introduction to Chemistry*	2	A	Covers the basic concepts necessary for chemistry which is the study of matter. Knowledge of high school chemistry or advanced mathematics are not required.	
	BIO 104 E	基礎生化学 *Foundation of Biochemistry*	2	A	To study chemical basis of life. Introduction to the chemical nature and biological properties of low-molecular-weight substances and biopolymers as well as the biochemistry of basic cellular metabolism. Learning the basics of biochemistry, the fundamental subject of modern biology	
AM	CHM211 J	分析化学 I *Analytical Chemistry I*	2	A	To study the basics of the separation of matter and qualitative and quantitative analytical methodologies through chemical equilibrium and chemical reactions.	
	CHM212 J	分析化学実験 *Analytical Chemistry Laboratory*	2	W	Through the analysis of river water, the basic analytical methodologies of analytical chemistry, such as error analysis, volumetric analysis and colorimetric analysis etc are studied.	
	CHM221 E	無機化学 I *Inorganic Chemistry I*	2	S	Inorganic Chemistry I firstly deals with the basics of atomic, electronic and molecular structure, then covers bonding theory, and aims to give an understanding of the periodicity of the elements and the most important aspects of inorganic chemistry, which are the structure, properties and reactivities of inorganic substances and the relationship between them.	
	CHM231 J	有機化学 I *Organic Chemistry I*	2	W	This course deals with the relationship between the structures of organic compounds and their physical properties as well as their chemical reactivity and also covers the rules determining the reactivity and reaction mechanism.	
	CHM232 J	有機化学実験 Organic Chemistry Laboratory	2	S	Students learn physical and chemical properties of organic compounds through experiments. Training is given in the correct handling of chemicals, synthesis and structural determination of organic compounds. Desirable to take Organic Chemistry I as well.	
	CHM241 J	物理化学 I *Physical Chemistry I*	2	S	This lecture course aims to study the basics of quantum theory, e.g. wave equation, wave function and expectation value.	
	CHM242 J	物理化学実験 *Physical Chemistry Laboratory*	2	S	Experiments in quantitative measurement of thermodynamic, electrochemical and spectroscopic properties of materials.	
	CHM251 J	化学実験 *Experiments in Chemistry*	2	A	This course applies the skills acquired in the General Chemistry Laboratory to investigate experimentally selected aspects of Organic, Analytical, Inorganic, and Physical Chemistry.	
	PHY201 E	自然科学のための数学 *Mathematics for Natural Scientists*	2	S	This course provides an introduction to mathematics mainly for physicists. Recommended to be taken after at least two fundamental Mathematics courses, LINEAR ALGEBRA I and CALCULUS.	
	CHM311 J	分析化学 II *Analytical Chemistry II*	2	W	This course deals with quantitative separation and analysis of matter based on knowledge of Analytical Chemistry I. Trace analysis and instrumental analysis are also introduced.	
	CHM313 J	分析化学特論 *Selected Topics in Analytical Chemistry*	2	A	Studies on ultra trace and precision analysis. Total overview of latest analytical methods as the basis of material science.	Offered alternative year
	CHM321 J	無機化学 II *Inorganic Chemistry II*	2	W	The chemistry of the s and p block elements and compounds.	
	CHM322 E	無機化学 III *Inorganic Chemistry III*	2	S	The chemistry of the transition metals, concentrating on coordination chemistry and covering complex geometries, reaction mechanisms, electron configurations, bonding in complexes, optoelectronic spectra, magnetism.	
	CHM323 J	無機化学特論 *Selected Topics in Inorganic Chemistry*	2	A	This course presents the chemistry of the d block elements and exemplifies the principles learned in Inorganic Chemistry I.	Offered alternative year
	CHM324 E	無機化学実験 *Inorganic Chemistry Laboratory*	2	A	This course aims to give students familiarity with certain aspects of inorganic chemistry, in particular, experimental, synthetic and analytical techniques, transition metal complexes, color, magnetic properties, structural types and isomers.	
	CHM331 J	有機化学 II *Organic Chemistry II*	2	S	Students learn the characteristics of aromatic compounds, organic photo-reactions, and stereospecific pericyclic reactions from the viewpoint of physical organic chemistry.	
	CHM333 J	有機化学特論 *Selected Topics in Organic Chemistry*	2	S	Studies on transition metal catalytic reactions using organometallic complexes and discussion based on literatures of recent research.	Offered alternative year
	CHM341 J	物理化学 II *Physical Chemistry II*	2	A	Understanding the structure of the hydrogen atom based on the Schrodinger wave equation. Diatomic and polyatomic molecules are explained by introducing molecular orbital.	
	CHM342 J	物理化学 III *Physical Chemistry III*	2	W	Basic principles of spectroscopy applying the quantum chemistry from Physical Chemistry I and II. Statistical thermodynamics linking quantum chemistry and thermochemistry.	
	CHM344 J	物理化学特論 *Selected Topics in Physical Chemistry*	2	W	Studies on recent experimental and theoretical methods in chemistry to understand the basis of the physical changes of matter and energy.	Offered alternative year
	CHM351 J	化学特別実験 I *Advanced Laboratory in Chemistry I*	2	A	Experiments on the chemical method such as organic synthesis, separation, and structure determination as well as the principles experimental manipulation of accurate analysis for physical and chemical properteis.	
	CHM352 J	化学特別実験 II *Advanced Laboratory in Chemistry II*	2	W	To study up to date synthetic methods, separation and analysis used in chemical research.	
	CHM381, 382	化学特別研究 I, II *Studies in Chemical Research I, II*	2, 2	S, A	Advanced studies of special interest topics in Chemistry.	
	BIO 312 E	生化学 *Biochemistry*	2	W	Nitrogen cycle in the biosphere, biological nitrogen fixation, biosynthesis and catabolism of amino acids, proteins, nucleic acids, porphyrins, etc. Recommended to be taken after FOUNDATION OF BIOCHEMISTRY	

Model Schedule for Chemistry-Major (September Students)

Year	Term	Lng (LG) (?)	Phys Edu (PE) (4)	Gen Edu (GE) (21)	Foundation (NS)(6+12)	Unit	Area Major I (AM-I)(18) CHM2XX courses	Unit	Area Major II (AM-II)(32)CHM3XX courses	Unit	Electives (EL)	Units	Total
FR	A		1+ 1/3	3	LIN ALG I (J) INTRO PHYS **	3 2					△INTRO CHEM INTRO MATH (E)	2 3	13 + 1/3 or 14 + 1/3
	W		1/3	3	☆CONCEPT CHEM CALCULUS I	2 3					INTRO PHYS LAB *** FND PHYS (E) ** FND BIO (E) * LIN ALG I (E) LAB INFO SCI (E)	2 2 2 3 2	13 + 1/3 or 14 + 1/3
	S		1/3	3	☆GEN CHEM ☆FND CHEM LAB INFO ETHICS	2 2 2					CALCULUS I (E) LIN ALG II INTRO BIO * MATH NAT SCI FND PHYS LAB *** HOT TOP PHY ** LAB FDN BIO ***	3 2 2 2 2 2 2	13 + 1/3 or 14 + 1/3
SO	A			3-6			ANA CHEM I INORG CHEM I EXP IN CHEM	2 2 2					13
	W			3-6			ANA CHEM LAB ORG CHEM I	2 2	INORG CHEM II ANA CHEM II	2 2			13
	S			3-6			ORG CHEM LAB PHYS CHEM I PHYS CHEM LAB	2 2 2	INORG CHEM III ORG CHEM II	2 2			13
JR	A								PHYS CHEM II INORG CHEM LAB SELTOP INORG CHEM $	2 2 2	FND BIOCHEM (LAB IN BIOCHEM: AUTUMN BREAK)	2 2	13
	W			HISTORY OF SCIENCE 2					PHYS CHEM III ADV LAB CHEM I ADV LAB CHEM II	2 2 2	BIOCHEM		12
	S			PHILOSOPHY OF SCIENCE 2					STD CHEM RES I SELTOP ORG CHEM $	2 2			9
SR	A			SIS 3					STD CHEM RES II SENIOR THESIS I SELTOP ANA CHEM $	2 3 2	GERMAN/FRENCH ETC.		7
	W								SENIOR THESIS II SELTOP PHYS CHEM $	3 2			5
	S								SENOR THESIS III	3			3
REQ. UNITS		?	1+1	21 (INC. Introduction to Christianity 3UNITS)	18 (INC. CHEM FND (☆, 6 UNITS) TO BE COUNTED AS AREA MAJOR UNITS)		・SINGLE MAJOR: 30 (Including SENIOR THESIS 9) ・MINOR:15		AREA MAJOR II TO BE COUNTED AS ELECTIVES As many Area Major I and II courses are recommended to be taken				136

☆ : Strongly recommend as Chem major Foundation courses (Total 6 u $: offered in alternate years

△ : Recommend course to whom did not take al the chemistry courses in high school. Strongly recommend to take this course before doing ☆ cour

* : Recommend to take either one courses which marked with *

** : Recommend to take either one courses which marked with **

*** : Recommend to take either one courses which marked with ***

・**Pre-requirement for Chemistry major:**

1) Major, Minor or Double Majors all require one course from Introduction to Chemistry, Concepts in Chemistry, General Chemistry, Foundation of Chemistry Lab.

2) No grade requirement.

・**Courses strongly recommended for Chemistry Major:**

1) Foundation courses (FD): Chemistry FD (Concepts in Chemistry+General Chemistry+Foundation of Chemistry Lab=Total 6 units) , Math FD(3+3) and one FD course each from Physics, Computer Science, Biology(2+2+2), as well as one Lab FD course from Physics, Computer Science, Biology (2: lab course will be elective)

2) Area Major courses(AM): Area Major I + as many AM II courses as possible. Special Studies in Chemistry I, II should be included.

・**Courses strongly recommended for Chemistry Minor:**

1) Foundation courses (FD): Concepts in Chemistry+General Chemistry+Foundation of Chemistry Lab = 6 units

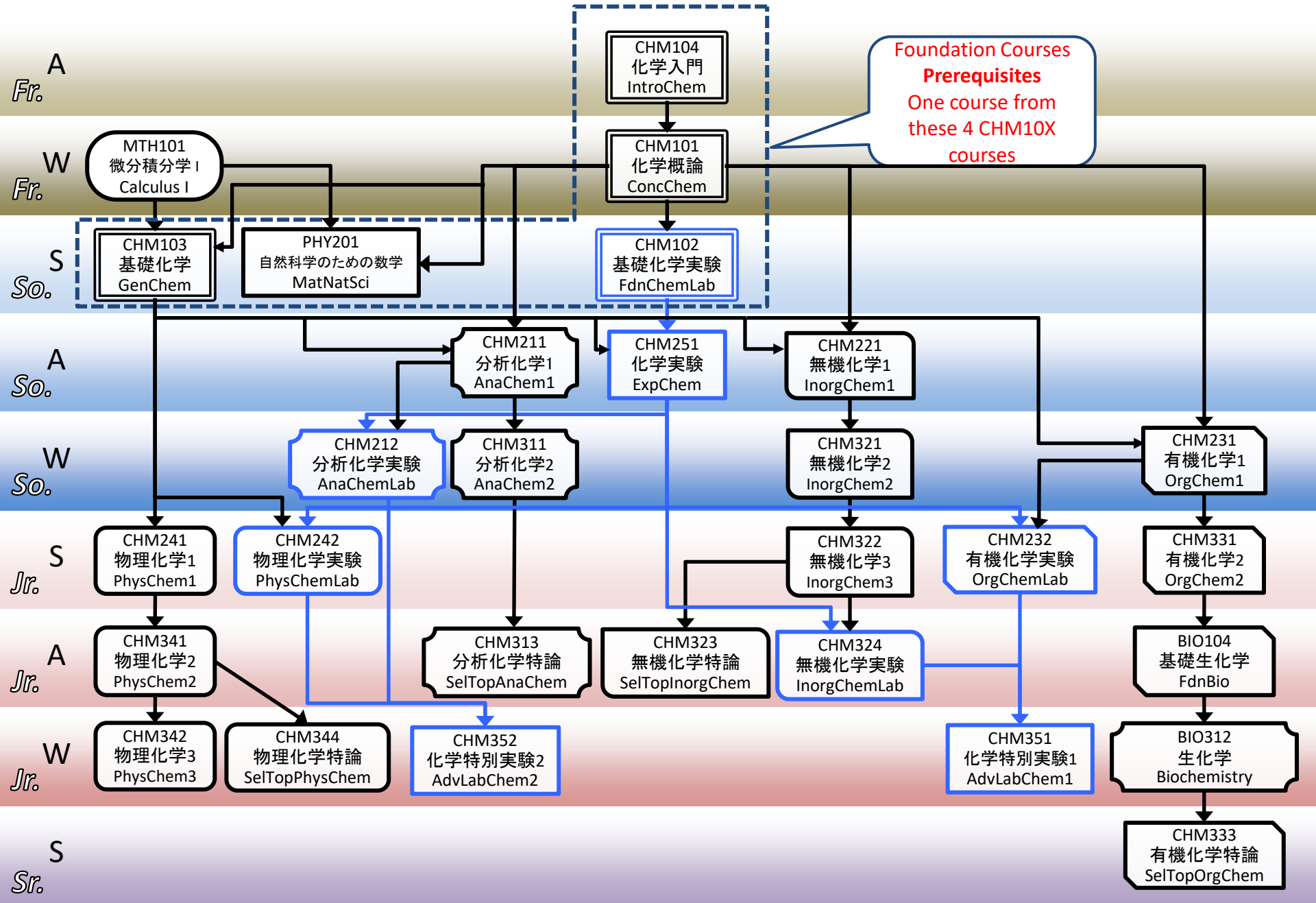
2) Area Major courses(AM): 15 units from Area Major I (18 units)

・Required units（Single major）

Courses	Units	Comment
LNG	?	
GEN	21	INC. Intro. to Christ 3units
PE	2	
FND	18	INC. CHEM FND (☆, 6 UNITS)
AM	21	
EL	?	Depends on your LNG requirements
Thesis	9	
Total	136	

NS:6 units, HS: 3 units, SS: 3 units

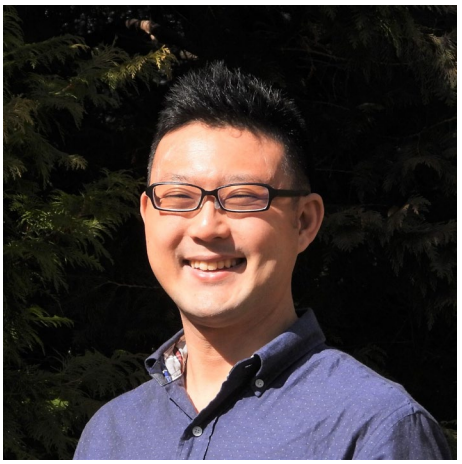
Chemistry Major Curriculum Flowchart



Information Science

Faculty Members

Keisuke Ishibashi
石橋 圭介
Major Advisor



Takashi Kaburagi
鏑木 崇史

Keiji Ohta
太田 啓路

Andrea Matz
マツ, アンドレア
Major Advisor

情報科学メジャーの科目　Information Science Major Courses

全学共通科目（一般教育科目） College-Wide Programs (General Education)

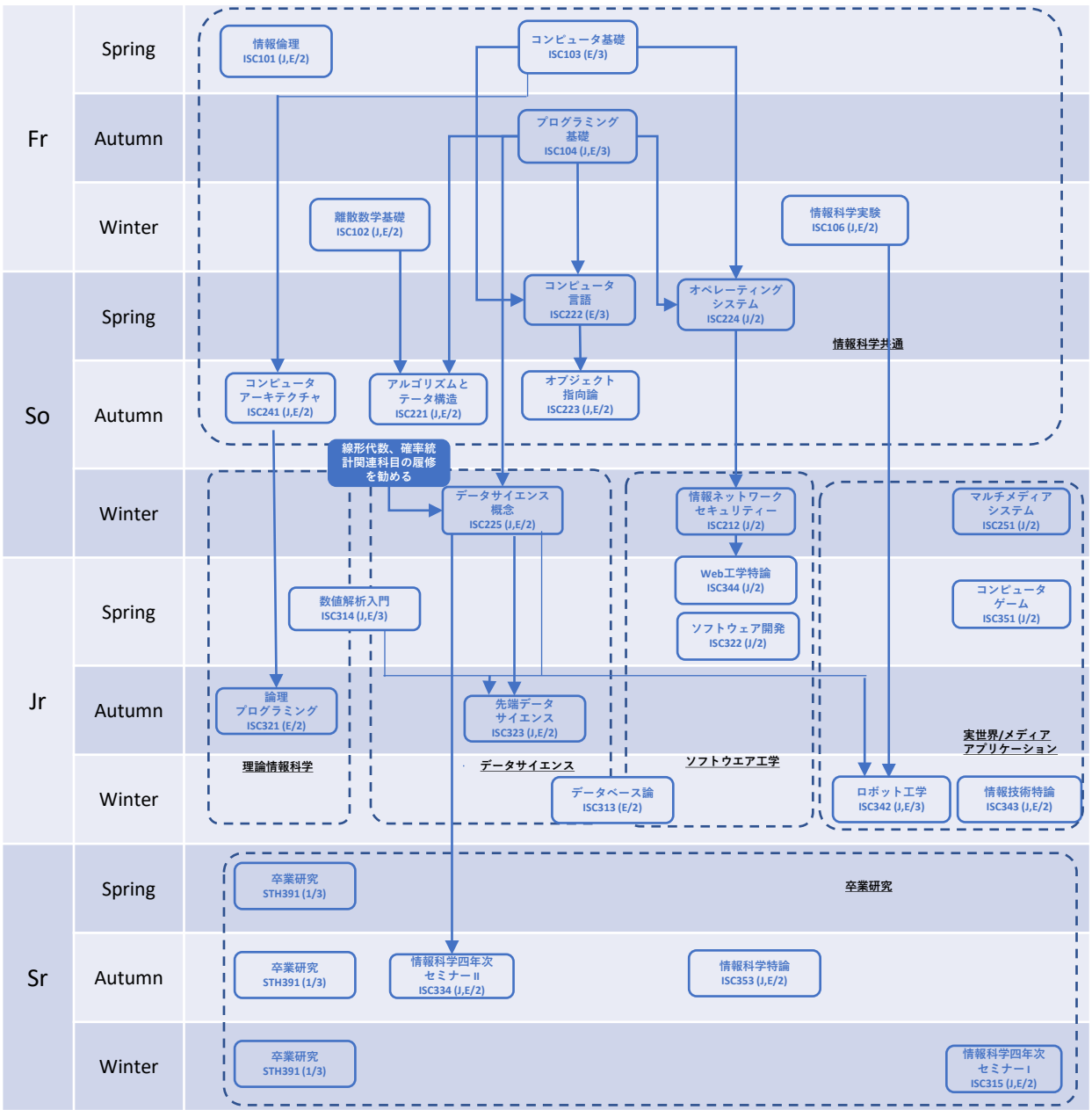
Course No. 科目番号	Course Title	科目名	Unit 単位
GEN000			
GEN021	Computers and Human Interaction (Canceled in AY2023)	コンピュータと人間 (AY2023は非開講)	3
GEN023	Introduction to Computer Science	情報科学概論	3
GEN026	Ideas of Data Science	データサイエンスの考え方	2
GEN061	Computer Literacy	コンピュータ・リテラシー	2
GEN062	Digital Network Information Literacy	ネットワーク情報活用	2
GEN063	Multimedia Communication Literacy	理解のためのマルチメディア	2

情報科学メジャー　Information Science Major

Course No. 科目番号	Course Title	科目名	Unit 単位
ISC100			
ISC101	Information Ethics	情報倫理	2
ISC102	Elements of Discrete Mathematics	離散数学基礎	2
ISC103	Foundation of Computers	コンピュータ基礎	3
ISC104	Foundation of Programming	プログラミング基礎	3
ISC106	Laboratory in Information Science	情報科学実験	2
ISC200			
ISC212	Information Network Security	情報ネットワークセキュリティー	2
ISC221	Algorithms and Data Structures	アルゴリズムとデータ構造	2
ISC222	Computer Languages	コンピュータ言語	2
ISC225	Data Science Concepts	データサイエンス概念	2
ISC223	Object-Oriented Method	オブジェクト指向論	2
ISC224	Operating Systems	オペレーティングシステム	2
ISC231	Boolean Functions and Logic Circuit Design	論理関数とその応用	2
ISC241	Computer Architecture	コンピュータアーキテクチャ	2
ISC251	Multimedia Systems	マルチメディアシステム	2
ISC300			
ISC313	Database Systems	データベース論	2
ISC314	Numerical Methods in Science	数値解析入門	3
ISC315	Senior Seminar in Information Science I	情報科学四年次セミナー I	2
ISC321	Logic Programming	論理プログラミング	2
ISC322	Software Development	ソフトウエア開発	2
ISC323	Advanced Data Science	先端データサイエンス	2
ISC333	Seminar in Theory of Computation	計算理論セミナー	2
ISC334	Senior Seminar in Information Science II	情報科学四年次セミナー II	2
ISC342	Robotics	ロボット工学	3
ISC343	Topics in Information Technology	情報技術特論	2
ISC344	Topics in Web Technology	Web工学特論	2
ISC351	Computer Games	コンピュータゲーム	2
ISC353	Topics in Information Science	情報科学特論	2
STH391	Senior Thesis	卒業研究	9

カリキュラムツリー

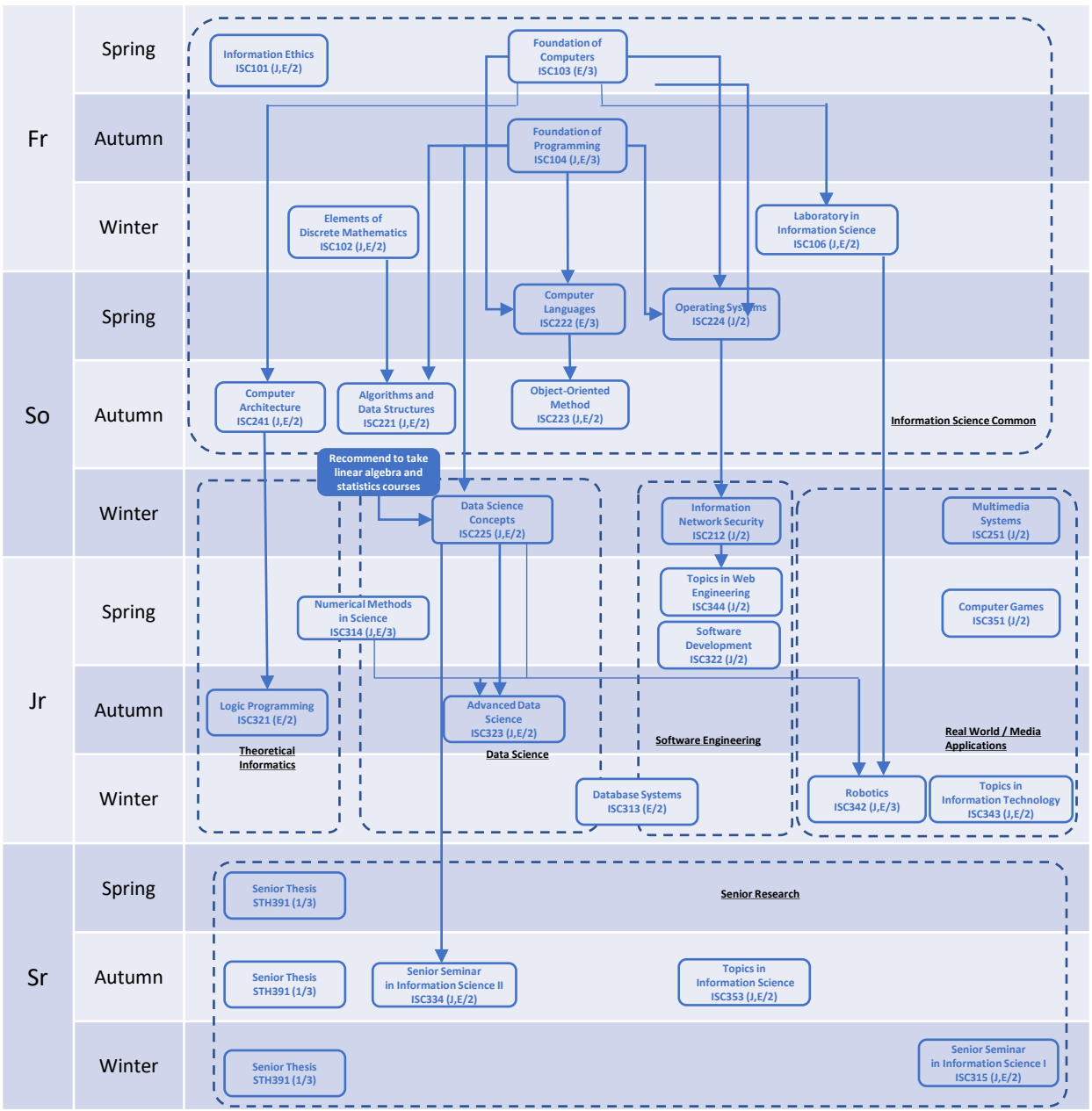
- ISC103コンピュータ基礎、ISC104プログラミング基礎 or ISC106情報科学実験、ISC221アルゴリズムとデータ構造, ISC224 オペレーティングシステムは、情報科学メジャーのコア科目であり、メジャー選択前の履修を強く勧める。
  - 特にプログラミング未経験者は、200番台の講義履修前にプログラミング基礎もしくは情報科学実験でプログラミングを学ぶこと。
- 情報倫理は他の科目とは独立であり、いつ履修しても問題ない。
- データサイエンス系科目の履修にあたっては、事前に確率統計の基礎、線形代数の基礎を学ぶことを勧める。



この順序での履修を勧める

Curriculum Tree

- "ISC103 Foundation of Computers", "ISC104 Foundation of Programming" or "ISC106 Laboratory in Information Science", and "ISC 221 Algorithm and Data Structures", "ISC224 Operating Systems" are the core courses of Information Science (ISC) major and strongly recommended before ISC major declaration.
  - Specifically, students who do not have any programming experience must learn programing at ISC104 or ISC106 before taking 200-series courses.
- "ISC101 Information Ethics" is an independent course and can be taken at any time.
- Before taking Data Science related courses, it is recommended to learn the foundation of statistics, probability and linear algebra.

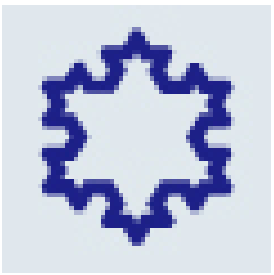


Mathematics major

Yuji Shimizu
Algebraic Geometry
清水勇二　教授
代数幾何学
Major advisor

Mitsuru Yamazaki
Theory of Nonlinear Partial Differential Equations
山崎満 教授
非線形偏微分方程式論
Major advisor

Tomoo Matsumura
Algebraic Topology and Combinatorics
松村朝雄 准教授
代数的トポロジーと組み合わせ論
Major advisor



Math Course

	Course Number	Title	Units	Term	Course Description : [Key Words]	Remark
Fdn	MTH102 J,E	Introduction to Mathematics	3	S + A	Covers the basic concepts necessary for college-level mathematics, mainly foundation of calculus of one-variable functions.. [limits, continuity, elementary functions, differentiation, indefinite/definite integrals, integration by substitution, integration by parts, applications of definite integrals]	The content of lecture is not premised on the completion of high school calculus.
	MTH101 J	Calculus I	3	W + S	Calculus of one-variable and many-variable functions in continuation to Introduction to Mathematics. [differentiation and integration of functions of one variable, the concept of continuity, partial derivatives, extrema problem, multiple integrals]	Prerequisite: high school calculus (Mathematics III) or Introduction to Mathematics.
	MTH103 J,E	Linear Algebra I	3	A + W	Introductory courses on linear algebra basic to further study in mathematics. [vectors, matrices, rank of a matrix, determinants, solutions of systems of linear equations, eigenvalues, eigenvectors and matrix expression of linear transformations]	
	MTH105 J	Hot Topics in Mathematical Sciences	2	S	This course presents hot topics in mathematical sciences from a wide perspective and discusses breadth and depth of mathematics.	Prerequisite: high school mathematics
AM	MTH233 J	Linear Algebra II	2	S	General theory of vector spaces in continuation to Linear Algebra I. [general vector spaces (including a complex vector space), linear independence, linear transformations, their matrix representations, vector spaces with metric]	
	MTH231 E	Topics in Linear Algebra	2	A	Further study of selected topics of Linear Algebra in continuation of Linear Algebra II. [eigenvalues, eigenvectors, diagonalization, standard form of a matrix, quadratic forms]	
	MTH211 J	Calculus II (Vector Calculus)	2	S	Vector calculus, including necessary topics in calculus of many-variable functions.. [derivation of vector-valued functions, line and surface integrals, theorem of Stokes, theorem of Gauss and potential fields]	Prerequisite: Calculus.
	MTH212 J	Function Theory of One Complex Variable	2	W	Calculus of complex functions. [derivatives and integrals of functions of a complex variable, power series, calculus of residues, analytic continuation].	Prerequisite: Calculus.
	MTH213 J	Theory of Differential Equations	2	A	Introduction to the theory of differential equations. [linear ordinary differential equations, existence theorem of solutions, eigenvalue problems]	Prerequisite: Calculus.
	MTH232 J	Basic Concepts in Mathematics I (Sets and Algebraic Structures)	2	S	Foundation of sets and algebraic structures basic to modern mathematics. [sets and mappings, equivalence relations and equivalence classes, cardinal, and algebraic structures]	
	MTH214 J	Basic Concepts in Mathematics II (Introduction to Analysis)	2	A	Critical review of basic concepts in calculus. [continuity, structure of real numbers, limits, continuous functions, Riemannian integrals, convergence of series]	Recommended to be taken after Basic Concepts in Mathematics I.
	MTH251 J	Basic Concepts in Mathematics III (General Topology)	2	W	Introduction to topological structures basic to modern mathematics. [metric spaces, topological spaces, connectedness, compactness, separation axioms].	Recommended to be taken after Basic Concepts in Mathematics I, II.
	MTH271 J	Introduction to Probability and Statistics	2	A	Foundations of probability and mathematical statistics. [random variables, probability distribution, expectation, variance, covariance, Bernoulli distribution, binomial distribution, geometric distribution, probability density, distribution function]	Prerequisite : Introduction to Calculus or high school calculus (Mathematics III)
	MTH272 J	Probability and Statistics	2	W	Further study of probability and statistics. [theory of probability, descriptive statistics, inductive stochastics, central limit theorem, law of large numbers]	Prerequisite : Calculus, Introduction to Probability and Statistics.
	MTH311,312 J	Analysis I, II	2, 2	S, A	Introduction to modern analysis. [theory of measure, Lebesgue and Stieltjes integrals, Hilbert spaces, Banach spaces, Fourier analysis, distributions]	Prerequisite: Calculus. Recommended to be taken after Basic Concepts in Mathematics II.
	MTH331, 332 E	Algebra I, II	2, 2	S, A	Introduction to modern algebra. [group theory, ring theory]	Prerequisite: Linear Algebra II. Recommended to be taken after Basic Concepts in
	MTH351, 352 E	Geometry I, II	2, 2	S, A	Introduction to modern geometry. [differentiable manifolds, tangent vectors, tangent spaces, metrics, differential forms]	Prerequisite: Calculus, Linear Algebra. Recommended to be taken after Basic Concepts in Mathematics III
	MTH382, 383, 384 J,J,E	Advanced Seminar in Mathematics I,II,III	2	W	Seminar on an advanced theme of mathematics.	
	MTH385, 386 J	Senior Seminar in Mathematics I, II	2, 2	S, A	Seminar for senior students of mathematics major, where he/she studies advanced subjects in a specific field of mathematics.	
	MTH387,388, 389,390 J	Topics in Mathematics I, II, III, IV	2, 2	W, W	Aims to provide advanced knowledge of modern mathematics. The topics are selected by the instructor among various fields of analysis, algebra, geometry, etc. Two periods of lecture weekly.	
	STH391	Senior Thesis	3,3,3	S, A, W	Senior students, under the guidance of an advisor, will select a subject related to their major and prepares a senior thesis. The final product should represent the efforts of one year of sustained and rigorous thinking, research, and writing. Required of all students in their senior year.	

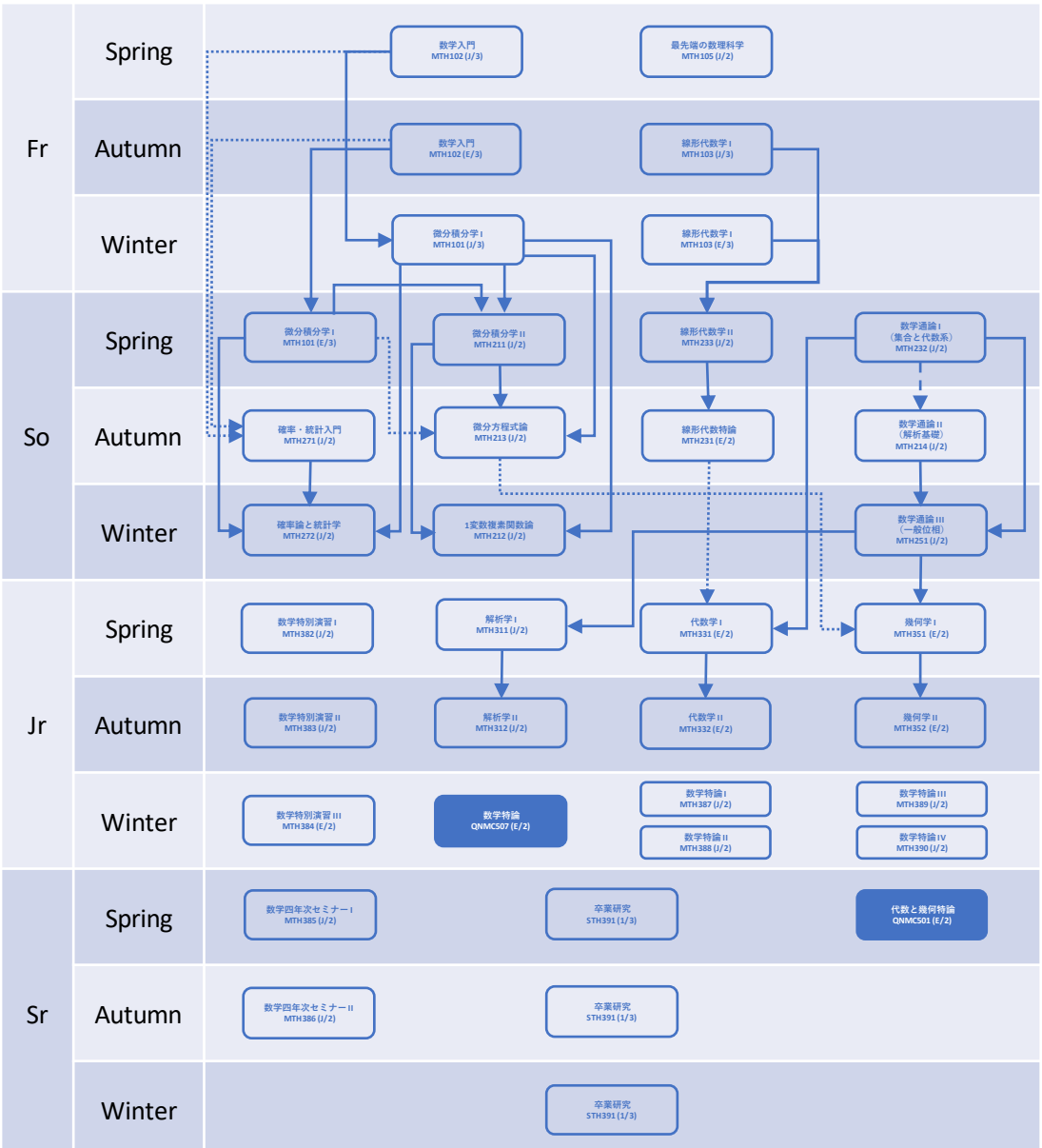
2023 Model Schedule for September Students

	Y	T	L	PE	GE	Foundation	Area Major	Elective
2023		A				Introduction to Mathematics (E) 3 (Linear Algebra I 3		
	Fr.	W				Calculus I 3 Linear Algebra I (E) 3		
2024		S				Calculus I (E) 3 Introduction to Mathematics 3	Linear Algebra II 2 Basic Concepts in Math I (Sets and Algebraic Structure) 2 Calculus II (Vector Analysis) 2	
	So.	A					Topics in Linear Algebra 2 Basic Concepts Math II (Introduction to Analysis) 2 Theory of Differential Equations 2	Introduction to Probability and Statistics 2 Teaching Method in Math III 2
		W					Basic Concepts in Math III (General Topology) 2 Function Theory of One Complex Variable 2	Probability and Statistics 2 Teaching Method in Math IV 2
2025		S					Algebra I 2 Analysis I 2 Geometry I 2	Advanced Seminar in Math I 2
	Jr.	A					Algebra II 2 Analysis II 2 Geometry II 2	Advanced Seminar in Math II 2 Teaching Method in Math I 2
		W			History of Science 2			(Topics in Math III, IV) 2,2 Topics in Math I, II 2,2 Advanced Seminar in Math III 2 Teaching Method in Math II 2
2026		S			Philosophy of Science 2			Senior Seminar in Math I 2
	Sr.	A			SIS 3		卒論 Senior Thesis 3	Senior Seminar in Math II 2
		W					卒論 Senior Thesis 3	
###		S					卒論 Senior Thesis 3	
			x	2	21	≧18	≧21+9	

Language units x + Elect ≧ 65

Curriculum Tree: 数学

Last Update 2020/3/10

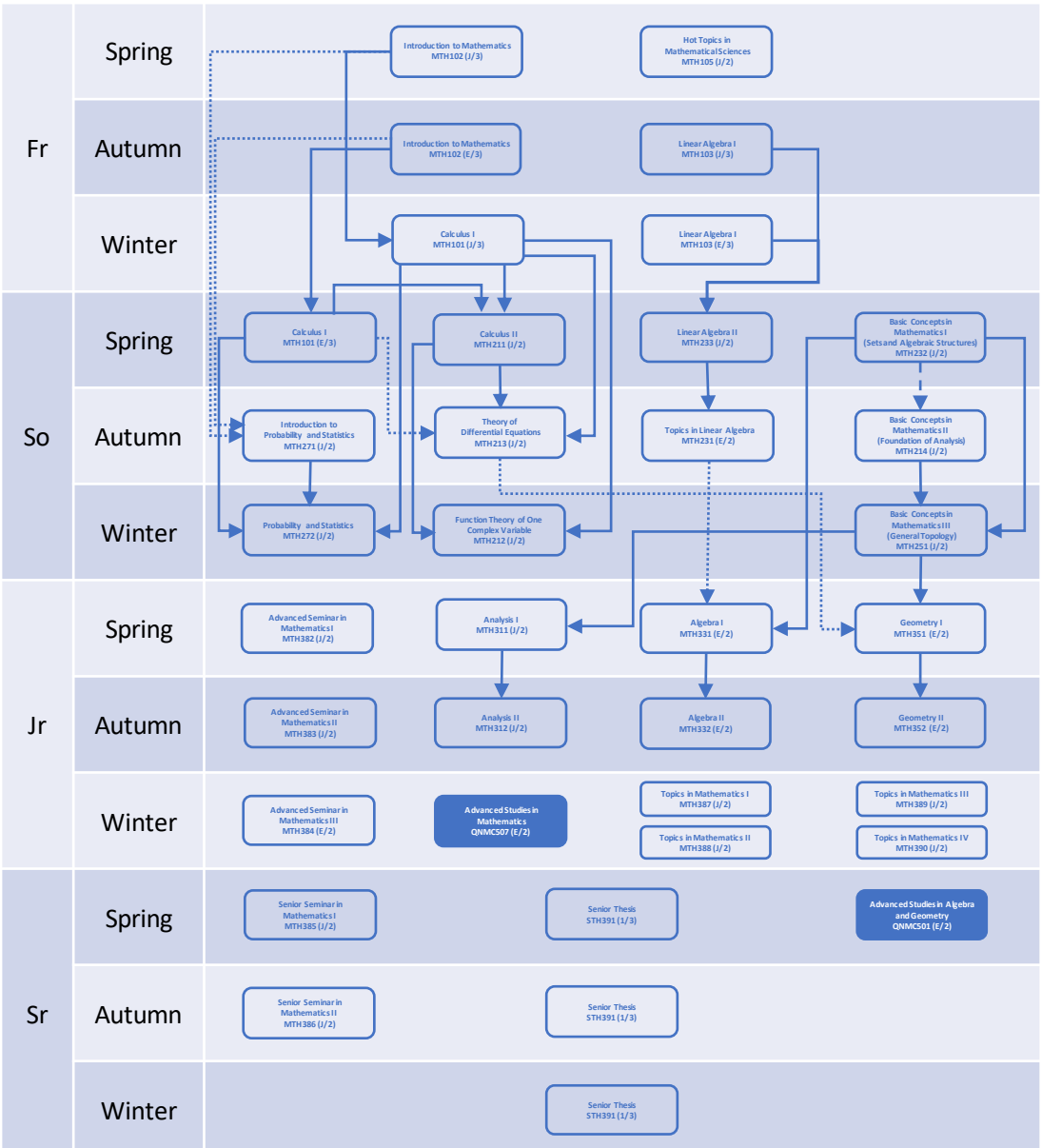


この順序での履修を強く勧める

この順序での履修を勧める

Curriculum Tree: Mathematics

Last Update 2020/3/10

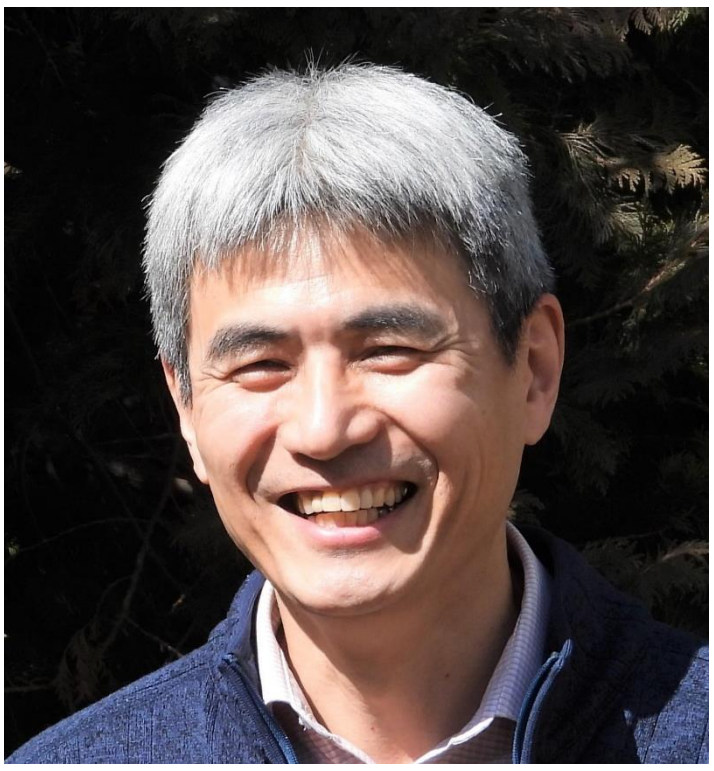


Physics

物理学メジャー
専任教員

Prof. Hideki OKAMURA

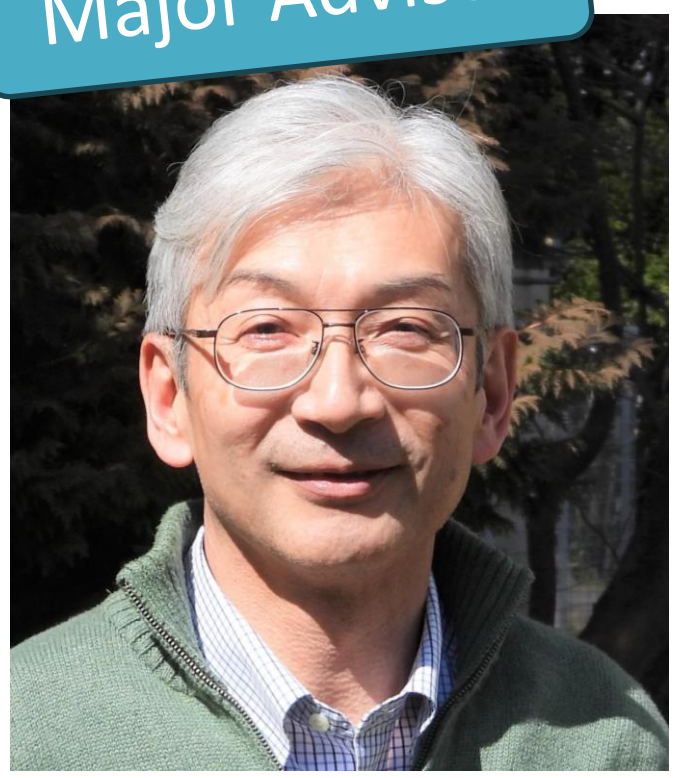
岡村 秀樹 教授
Laser Physics
レーザー物理学



Prof. Dai HIRASHIMA

平島 大 教授
Condensed-matter Physics
物性物理学

Major Advisor



Prof. Ken OKANO

岡野 健 教授
Solid State Physics
固体物理学

Major Advisor

Assoc. Prof.
Rekishu YAMAZAKI

山崎 歴舟 准教授
Quantum Information
量子情報

Senior Assoc. Prof.
Eckhard HITZER
Mathematical Physics
数理物理学

Physics Major Model Schedule for AY 2023 September Students

Y	T	JLP	PE	GE	Foundation (Major) Fdn–P (PHY1**)	Foundation (Others) Fdn–O (XXX1**)	Area Major I AM–I (PHY2**)	Area Major II AM–II (PHY3**)	Electives EL
Fr.	A		1/3	3	◇ Intro. **Phys.** 2	◇ Intro. Math. 3			
	W		1/3	3	**Fdn. Phys.** 2 **Intro. Phys. Lab.** 2	○ Linear Alg. I 3 ○ Calculus 3			
	S		1/3	3	Hot Topics in Phy 2 **Fdn. Phys. Lab.** 2	Fdn. Computers 3 Infrom.Ethics 2	**Mech. of Flu/Ela.** 2 **Phys. of Osc/Waves** 2 **Math. For Nat. Sci.** 2 ◎ Calculus II 2		○ Lin. Alg. II 2 B. C. in Math. I 2
So.	A		1/3	3		○ Fdn. of Programming 3 ◇ Intro. Chem. 2	**Modern Phys.** 2 Modern Phys. Lab. 2 ◎ Th. of Differ. Eq. 2		○ Lin. Alg. III 2 B. C. in Math. II 2
	W		1/3	3		Concepts Chem. 2	**Mechanics** 3 ◎ Compl. Func. of One Var. 2		B. C. in Math. III 2
	S		1/3	3		Gen. Chem. 2 Fdn. Chem. Lab. 2	**Electr. & Magnet.** 3 Inter. Phys. Lab. I 2	Spec. Std. in Phys. A 2	Analysis I 2
Jr.	A			3			**Quantum Phys.** 3 Inter. Phys. Lab. II 2	Spec. Std. in Phys. B 2	Analysis II 2
	W			2 HS			**Statistical Phys.** 3 Inter. Phys. Lab. III 2	Spec. Std. in Phys. C 2	
	S			2 PS.					
Sr.	A			2 SIS				Spec. Std. in Phys. VI 2 Sr. Thesis II 3	
	W							Spec. Std. in Phys. VI 2 Sr. Thesis III 3	
	S							Spec. Std. in Phys. V 2 Sr. Thesis I 3	
Units		max 45	2	15 + (max. 21)	Fdn–P = 6 + Fdn = Fdn–P + Fdn–O = 18 +		As Major, Major1 : AM–P = AM–I + AM–II = 21 + As Major2: AM–P = AM–I + AM–II = 30 + (whereas AM–II = 3 +) AM–O = 21 + from Major 1 AM As Minor: AM–P = AM–I + AM–II = 15 + AM–O = 21 + from Major AM AM = AM–P (+ AM–O) + Sr. Thesis 9		EL + (GE – 15) + (Fdn –18) + (AM – 21) = 36 + (DB 6+; MM 21+)

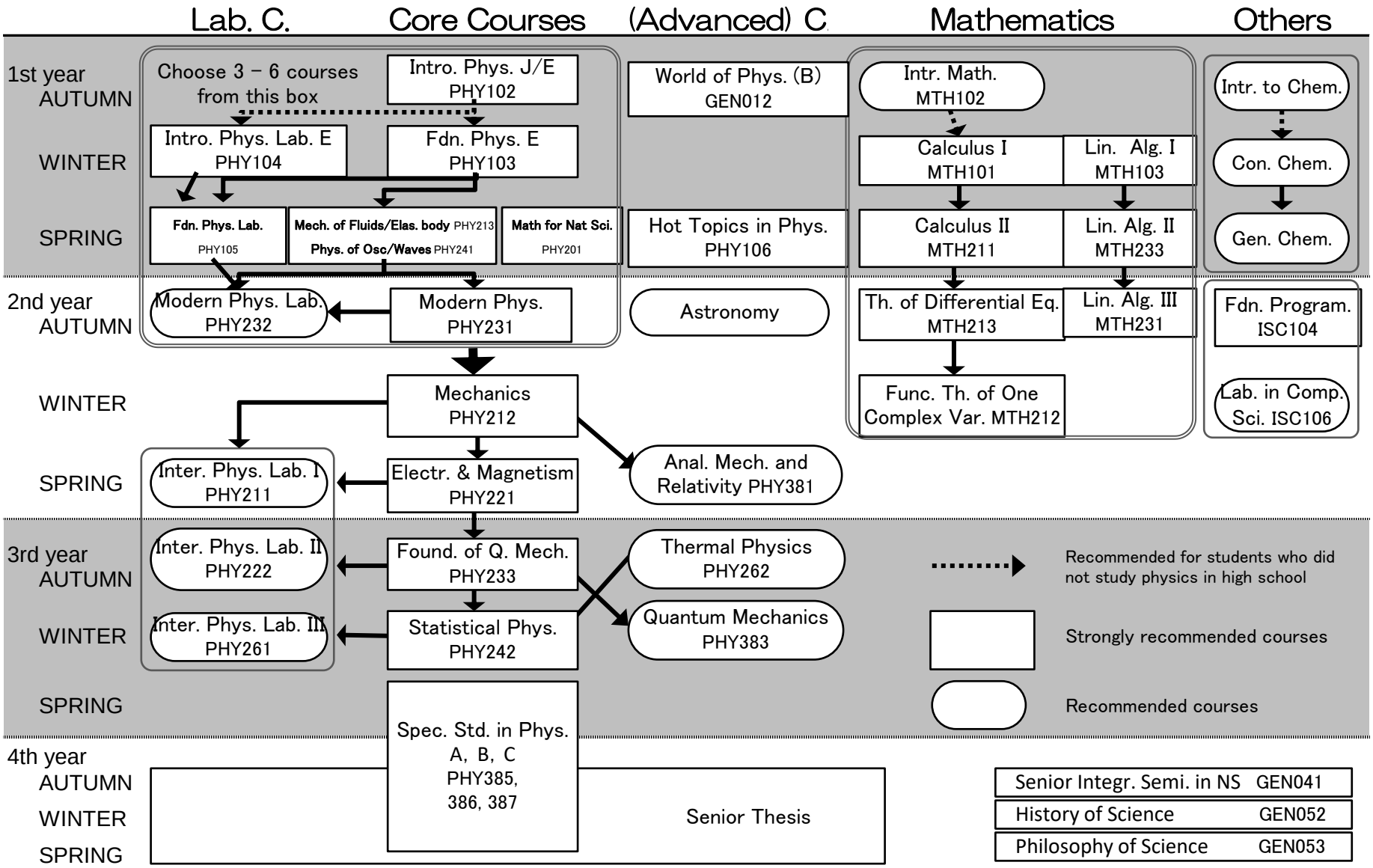
Bold: Core course of Physics Major

◇ Strongly recommended course for students who did not take those subjects in high school

○ Strongly recommended course besides physics

◎ Co-listed course as area major of physics

Flow Chart for Physics Major



Senior Integr. Semi. in NS	GEN041
History of Science	GEN052
Philosophy of Science	GEN053

AY2023

Environmental Studies 環境研究

メジャーについて

人間は環境の生きものです。人間は皆、自然環境、人間環境、社会環境を通して環境からの影響を受け、そして環境に影響を与えながら生きており、環境と無関係な生活、社会活動、生産活動はありません。したがって問題は、人間が環境とどんな関係を持ちながら生きているか、ということになります。

しかし、私たちは生命を支え、育む力をもち、同時に 全てを破壊する力を内包する地球環境の仕組みを理解し、その中で生かされている者という認識を持っているでしょうか。また、他の生物と共存すべき者としての自覚を持ち、自然環境と成熟した関係（破壊する関係でなく、互いを生かす関係）を築いて行こうとしているでしょうか。

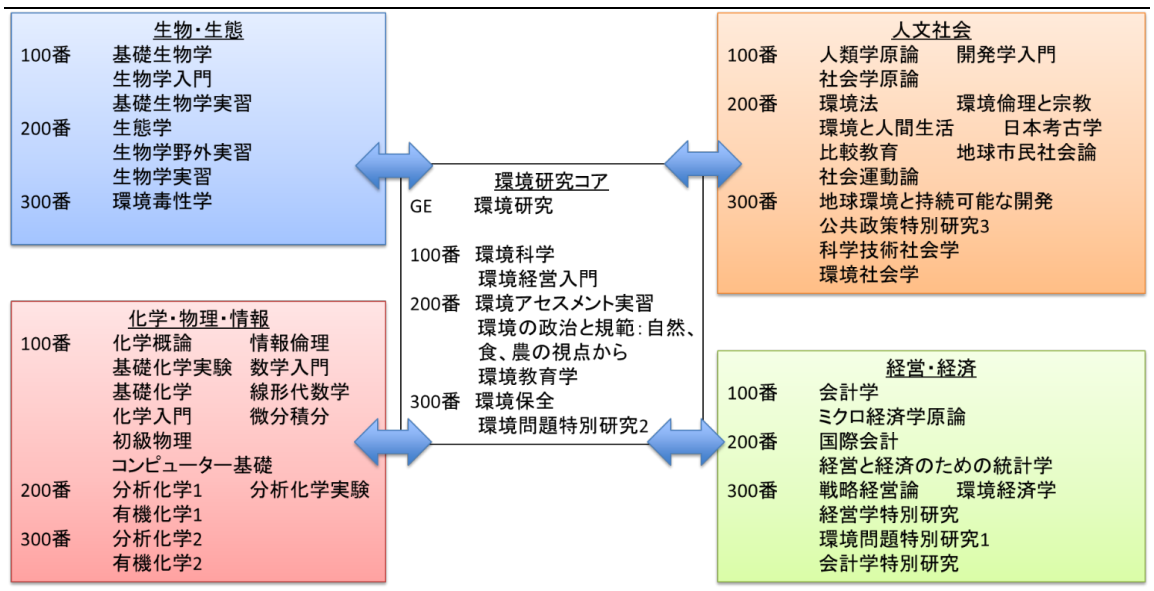
環境問題は、どんな生活、仕事に就く人にも関係する問題であり、だれも回避できない問題です。それ故に、いまこそ人間が営む生活、社会、産業活動と環境との関係を根本から検討し直し、成熟した地球市民としての行動を始める時ではないかという思いがあります。

環境研究メジャーでは確固たる基礎知識、高度な課題探求能力、幅広い視野に立ち分野の連携に目を向ける能力、そして行動力を身につけて社会が求める人財、求められる環境人財の育成を目標としています。

メジャー教員

田旺帝
藤沼良典
上遠岳彦
金澤雄一郎(特任)
小林牧人(特任)
久保謙哉
ランガガー、マーク
峰島知芳
溝口剛
布柴達男
岡村秀樹
岡野健
魯恩碩

履修はどうするのか？



環境研究という分野は人間と自然との調和を探っていくことを目的とするため**文系でもあり、理系でもあるという複合領域メジャー**です。 したがって履修の道筋としてはコアとなる環境研究メジャーがオファーしている基礎３科目（GE「環境研究」、100 番台の「環境経営入門」、「環境科学」）をまず履修して**自分自身の環境を見る視点を身につけること**をお勧めします。これら以外は環境研究メジャーのオファーしているコア科目（環境アセスメント実習、環境の政治と規範：［自然、食、農の視点から］、環境教育学、環境保全、環境毒性学、環境問題特別研究１、環境問題特別研究２）を中心にコリストしている生物・生態系、人文・社会系、経営・経済系、化学・物理情報系の科目の中から自分の環境に対する視点にあった科目を選んで履修していくことになります(上図参照)。

ただ、環境研究では座学だけではなく、現場へ行ってみる、実物を自分の目で見る、自分でやってみる、ことも大切であるため、実習、実験を積極的に履修することを強く勧めします。

どんなことが学べるのか？

［環境］に関わること全般

大きく４つに分けられる

1. 地球環境
2. 自然環境
3. 社会・地域環境
4. 人間環境

複数の専門科目を履修することによる分野ごとの環境への直接効果と他分野を経由する間接効果

- 根底にある考え方
- 環境に負荷をかけないこと
- 自然を守ること
- 人がハッピーであること

卒論のテーマの例

- 植物の環境ストレスに対する反応(溝口先生)
- エネルギー問題、再生・再利用エネルギー(岡村先生)
- 電気やエネルギー(岡野先生)
- 環境試料の放射能測定(久保先生)
- 大気汚染（峰島先生）
- 環境教育・エシカル(布柴先生)
- 学内の動物／野鳥／昆虫の生態調査(上遠先生)
- 旧約聖書における環境倫理（魯先生）
- 森林環境・土壌環境の仕組みと持続的管理（藤沼）
- 持続可能な街作り／ウェルビーイングなど（藤沼）

AY2023

Environmental Studies

About the Major

Human is a part of nature. We all receive influences from the natural environment, human environment, and social environment. Same time, we affect them through our daily lives because all of our activities relate to the environment directly or indirectly. In other words, the critical point is what kind of balance human is making with nature through their activities.

However, do we understand we live as part of an ecosystem that supports or destroys life forms? Do we understand the underlying mechanism of ecosystems or earth? Also, do we intend to construct balanced, sustainable relationships with our surrounding environments?

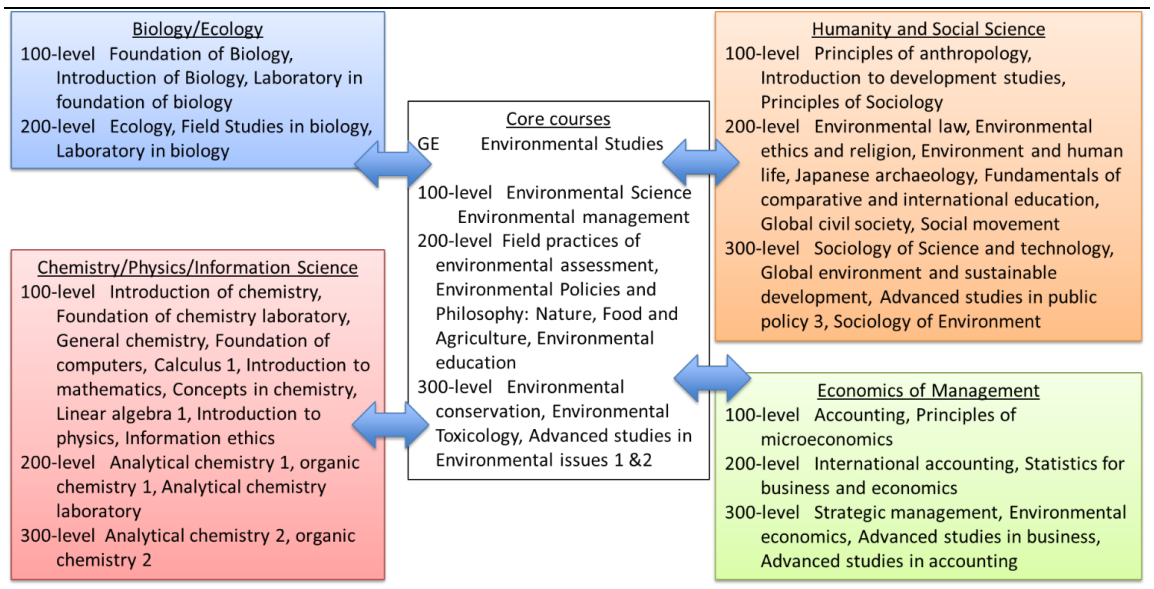
Environmental issues are related to any lifestyle and job and are unavoidable problems for all humans. Therefore, today is the day we should reevaluate our lifestyle, social activities, and industrial activities in terms of sustainability and start acting as mature global citizens.

Environmental Studies Major aims to guide the students to have strong fundamental knowledge, high critical thinking skills, expansive views across the subject areas, and self-motivation to deal with environmental issues from community level to global scale.

Major Faculty

Chun, Wang Jae
Fujinuma, Ryosuke
Kamito, Takehiko
Kanazawa, Yuichiro (Special Appointment)
Kobayashi, Makito (Special Appintment)
Kubo, Kenya
Langager, Mark W.
Minejima, Chika
Mizoguchi, Tsuyoshi
Nunoshiba, Tatsuo
Okamura, Hideki
Okano, Ken
Ro, Johannes Unsok

The curriculum



Environmental Studies major is a field to seek the sustainable balances between humans and the environment. Hence, the major is **an interdisciplinary major**, including natural sciences, social sciences, economics and business, and information technologies. We recommend students to take the core introduction courses (GE: Environmental Studies, 100 level: Environmental Management, Environmental Science) first with a vision of mastering their viewpoint regarding "Environment". Outside of that, students can take courses from Environmental Studies (ENV codes, such as Field practice of environmental assessment; Environmental policies and philosophy: nature, food and agriculture; Environmental education, Environmental conservation, Environmental toxicology, Advanced studies in Environmental studies 1 & 2) and other co-listed courses from Sociology, Education, Law, Humanity, Economics, Chemistry, Biology, Information Science, and Philosophy and Religion (see curriculum tree). Deepening the knowledge of Environmental Studies requires experiences outside of the classrooms, so we strongly recommend registering for laboratory and practical courses.

What can you learn?

Area related to "Environment" Roughly categorized into 4 areas

1. **Global environment**
2. **Natural environment**
3. **Social-regional environment**
4. **Human environment**

Taking multidisciplinary courses let you learn both direct effects and indirect effects

Bottom-line concepts

- **Less impacts on the environment**
- **Environmental conservation**
- **Balanced human well-being**

Possible topics for the thesis

- Plant response on environmental stresses
- Energy crisis and renewal energy
- Electricity and energy consumption
- Radi-isotope analyses of environmental samples
- Atmospheric pollution
- Environmental education
- Ethical consumption
- Environmental accounting/economics
- Animal ecology on campus
- Plant ecology on campus
- Environmental ethics in the Old Testament
- Environmental Law
- Sustainable development/intensification of systems
- Sustainable soil management