Miyazaki International College

Course Syllabus

Fall 2020

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| Course Title ( Credits ) | GSC102: Introduction to Natural/Life Science (3 Credits) |
| Course Designation for TC | N/A |
| Content Teacher |
| Instructor | Kazuki Tagawa |
| E-mail address | ktagawa@edu.miyazaki-mic.ac.jp |
| Office/Ext | MIC 1-321 ext. 3776 |
| Office hours | Tuesday 1620–1715, Wednesday 1620–1715 |
| Language Teacher |
| Instructor | Jason Adachi |
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| Office/Ext | MIC 2-205 ext. 3782 |
| Office hours | Tuesday 1545 – 1715, Thursday 1545–1715 |

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| Course Description: |
| Introduces concepts, experimental techniques, and scientific methodologies for exploring a natural life system. Examines aspects of the theory of evolutionary ecology.This course will examine the mechanisms of evolution by natural selection, adaptation, sexual selection, and biological interactions.Students have opportunities to collect and observe diversified organisms (e.g. insects, fish, birds and plants) from the perspective of evolutionary ecology. |
| Course Objectives: |
| Upon completion of this course, successful students should:Content Objectives: * Be familiar with the basic principles of evolutionary ecology (e.g. natural selection, sexual selection and biological interactions),
* Be familiar with similarity and diversity as the two faces of evolution.
* Be familiar with diversified organisms around us.

Language Objectives:* Know the vocabulary, and sentence structures necessary to discuss topics related to natural science,
* Know how academic science papers and reports are organized in English,
* Will have learned how to write a scientific report in English.

Critical Thinking Objectives:* Understand the value of studying the sciences,
* Be able to understand and evaluate ideas from different disciplinary perspectives,
* Know how to take effective notes by identifying relevant information from texts or lectures,
* Know the communication methods, and logic appropriate needed for scientific (and academic) work,
* Practice critical thinking about living and non-living things and their relationship to the environment,
* Be able to hypothesize and test hypothesis,
* Understand cause and effect,
* Understand the difference between objectivity and subjectivity,
* Be able to evaluate *and* document methods and data in a report,
* Be able to report information objectively.
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| Course Schedule: |
| Day | Topic | Content/Activities |
| 1 | IntroductionHow to make questions in evolutionary ecology | Introduction to courseTinbergein’s four questions, Adaptation (e.g. evolution of carnivorous plant *Nepenthes*), The basic principle of natural selection |
| 2 | The world of small creatures | Activity: Collecting and observing wood lice (*Dangomushi*) |
| 3 | Activity: Experiment (Behavioral ecology of wood lice) |
| 4 | The world of insects | Definition of Insects, Adaptation of insects, NicheActivity: Observation of Praying mantis (*Kamakiri*)Collecting insects on campus, Making specimens of insects with alcohol |
| 5 | Activity: Identification of insects with picture books |
| 6 | Activity: Presentation of insects on campus |
| 7 | The world of fish | Adaptation of fishActivity: Dissection of dried fish |
| 8 | The world of birds and dinosaurs | Adaptation of birds and dinosaursActivity: Watching movie about evolution of dinosaurs |
| 9 | Activity: Dissection of chicken wings |
| 10 | The world of plants | Definition of plants, leaves, flowers, fruits, seedsActivity: Collecting plants on campus, Identification of plants with picture books |
| 11 | Definition of life | Structure of cells, DNA, The definition of lifeActivity: Group discussion “Is *Doraemon* a living thing?” |
| 12 | Cell | Activity: Observation of cells with microscopes |
| 13 | Basic geneticsGenetic variation | Mendelian genetics, Genetic variation, Phenotypic variation, Quantitative trait loci (QTL) |
| 14 | Mutation | The mechanism of mutationActivity: Experiment (Alcohol patch test) |
| 15 | Darwinian natural selection 1. Basic ideas | Artificial selection: domestic animals and plants, Natural selection |
| 16 | The evolution of beak shape in Galapagos finchesActivity: Movie watching |
| 17 | Darwinian natural selection2. Experiment | Activity: Experiment (Experience evolution by natural selection! “*Origami birds*”) |
| 18 |
| 19 | Mid-semester exam |  |
| 20 | Sexual selection1. Female choice | Sexual dimorphism, Asymmetries in sexual reproduction, Bateman’s principle |
| 21 | Female preference, Direct benefit, Indirect benefit, Handicap principle, Sexy–son hypothesis, Sensory biases, Female choice in humans |
| 22 | Sexual selection2. Male-male competition | Combat, Sperm competition, Infanticide, Alternative male mating strategy |
| 23 | Male-male competition in humansActivity: Movie watching  |
| 24 | Sex | Benefit and cost of sexual reproduction, Red queen hypothesis |
| 25 | Predator–Prey relationship | Defense strategy, Mimicry, Warning color, Defense of plantsActivity: Let’s find bees and wasps! |
| 26 |
| 27 | Plant–Animal Interactions1. Pollination | Mutualism, Pollination, Pollinator, Deceptive pollination, Obligate pollination mutualism, Antagonist (e.g. nectar-thieves, florivores) |
| 28 |
| 29 | Plant–Animal Interactions2. Seed dispersal | Seed dispersal, Manipulation of animals |
| 30 |
|  | Final Examination |  |
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| Required Materials: |
| * Handouts (will be distributed when needed)
* Clear File Folder (for handouts)
* **Clothes that are comfortable to move around in (when fieldworks)**
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| Course Policies (Attendance, etc.) |
| You need to attend every class, and participate in classes (sleeping is *not* participating).If you miss a class, it is your responsibility to see your lecturer(s) afterwards (and perhaps other students who attended the class), to collect any handouts, and find out how to catch up on any work that you missed.If you anticipate being absent from a forthcoming class, you should email both of your lecturers to explain your absence at least one day in advance. You may need to turn off your phone before coming to class. |
| Class Preparation and Review |
| * Students are expected to spend an appropriate amount of time preparing for every class (an hour may be required for this) *plus* an appropriate amount of time (i.e. perhaps another hour) reviewing content and/or completing assigned tasks
* These may include: preparing for discussions and/or activities before the next class begins
* Students are also expected to spend an appropriate amount of time reviewing their own notes, maintaining a record of learned vocabulary, and highlighting questions and comments,
* Managing preparation and review is the responsibility of the individual student. If you want to pass this course, you need to do it.
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| Grades and Grading Standards |
| * Class activities (e.g. assigned tasks, quizzes) 20%
* Reports 20%
* Mid semester examination 20%
* Final examination 40%

 Total 100%Grades:A: Greatly exceeds course expectations and requirements.B: Exceeds course expectations and requirements.C: Adequately meets course expectations and requirements.D: Does not quite meet course expectations and requirements.F: Widely fails to meet course expectations and requirements.Grades will be awarded for participation in all intra-class and extra-class activities, submitted assessment items, and for providing correct answers on examinations. |
| Methods of Feedback: |
| Marks will generally be returned to students within one week of submitting assessment items. Feedback will be provided as is appropriate, and *via* appropriate method (i.e. written, verbal or other means). |
| Diploma Policy Objectives: |
| Work completed in this course helps students achieve the following Diploma Policy objectives:1. Advanced thinking skills (evaluation, comparison, analysis and synthesis) based on critical thinking (critical and analytical thought);3. The ability to identify and solve problems;4. Advanced communicative proficiency in English. |
| Notes: |
| 1) If you have any difficulties with this course, please talk to your lecturers. The majority of the course is based on group work and discussion (so called “Active Learning”). Asking questions without hesitation and sharing your ideas with others will help to make this class interesting and productive for everyone attending. 2) The class schedule, grading and policies/procedures are subject to change at the lecturer’s discretion. |

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|  | Advanced | Proficient | Developing | Emerging | No Attempt |
| Critical Thinking | Ability to Identify & Solve Problems | Insightful comments in class discussionsStudent shows proven ability to analyze data, gather and assess resources, and disseminate opinions in a scholarly manner. | Able to contribute to class discussions, and to perform a basic analysis of data, gather and assess resources, and express opinions in an adequate manner. | Beginning to visualize the ways in which information can be combined and applied to solving a given problem, but struggles with complex and relationships | Student shows motivation but must learn the concepts and mechanisms that apply to critical thinking, such as information gathering, assessment and synthesis | Insufficient effort or evidence of achievement |
| Information Gathering |
| Assessment of Credibility |
| Social Skills |
| Professional Skills |
| Global Perspectives | Cultural Relevancy | Fully engaged in current events and shows and understanding of social inequalities and cultural differences. | Student is aware of current events and world cultures, but is unable to apply macro-level situations to her/his own life. | Exhibits interest and intrigue in current events and world culture, but has difficulty understanding relevancy. | Student expresses one-sided ideals from an ethnocentric point of view. Completely lacks awareness of world issues or events. |
| Awareness of Current Events & Global Issues |
| English Language Ability | Reading | Exhibits fluency/near fluency in speaking and writing. Grammar and reading ability similar to native English speaker. Able to use context clues when faced with unfamiliar vocabulary. | Proficient English ability; relies mainly on familiar vocabulary. Should be encouraged to advance beyond comfort zone. | Adequate English ability; must reference dictionary often | Student has some English ability, but lacks confidence in using and understanding. Very limited vocabulary knowledge, struggles with grammar and pronunciation Unable to form questions |
| Writing |
| Oral Communication |
| Writing |
| Oral Communication |