



Stony Brook University



*Mechanical Engineering
Hybrid Syllabus
Last updated January 27, 2021*

Important Note: Every effort will be made to avoid changing the course schedule, but the possibility exists that unforeseen events will make syllabus changes necessary. It is your responsibility to check Blackboard for corrections or updates to the syllabus. Any changes will be clearly noted in course announcements or through Stony Brook email.

Part 1: Course Information

Course title:	Introduction to Robotics
Course no. and section:	MEC 529-56195
Classroom:	A312
Classes:	Monday and Wednesday 3:30-4:50 pm
Credit hours:	3
Semester:	Spring 2021
Prerequisite:	Undergraduate Dynamics
Instructor name:	Bruce W. Jo, Ph.D.
Instructor's email, phone, office:	bruce.jo@stonybrook.edu bruce.jo@sunykorea.ac.kr 032-626-1813 B624
Time zone:	KST (Korea Standard Time)
Office hours:	9-Noon every Thursday (in-person or virtual) By Appointment (any time available)
TA information:	TBA

Course materials:

- Lecture note and videos
- Introduction to Robotics, 3rd Edition, John J. Craig

Additional materials (advanced):

- Robot Modeling and Control by Mark W. Spong, Seth Hutchinson, M. Vidyasagar

Course Description:

MEC 529 deals with fundamentals of Robotics: kinematics, and dynamics in robotic manipulators as well as mobile robots, drones, and other interesting robotic systems. This course also covers modeling of 6 DOF manipulator, control, control design, and computer simulation of trajectory, inverse kinematics, forward kinematics, Jacobians. In addition to them, this course will require some hands-on works including computer-based simulation using Matlab, ADAMS, as well as implementation of a simple robot.

Course Delivery Mode and Structure:

This is a hybrid course, delivered both in the Blackboard learning management system (LMS) and in face-to-face meetings. Students must be mindful of all course expectations, deliverables and due dates, especially because the online portion of the course requires significant time management. All assignments and course interactions will utilize internet technologies. See “Technical Requirements” section for more information. In Blackboard, you will access online lessons, course materials, and resources. EACH WEEK HAS 2 LEARNING MODULES; with deadlines on Korea Standard Time (KST). Some variations will occur.

How We Will Communicate:

Course-related questions should be posted in the General Questions Forum in the course Discussion board. For personal/private issues, email me directly. If you use Blackboard’s **email tool** from the course site, it will automatically include your full name, course name and section when you send me an email. **Please allow between 24-48 hours for an email reply.** Your Stony Brook University email must be used for all University-related communications. You must have an active Stony Brook University email account and access to the Internet. All instructor correspondence will be sent to your SBU email account. **Plan on checking your SBU email account regularly for course-related messages.** To log in to Stony Brook Google Mail, go to <http://www.stonybrook.edu/mycloud> and sign in with your NetID and password. Regular announcements will be sent from Blackboard. These will be posted in the course site and may or may not be sent by email. Regular communication is essential in online classes. Logging in once a day, checking the discussion board and participating with your peers ensures that you are able to remain an active member of the class and earn full points for participation.

Technical Requirements:

This course uses Blackboard for the facilitation of communications between faculty and students, submission of assignments, and posting of grades and feedback. The Blackboard course site can be accessed at <https://blackboard.stonybrook.edu>

If you are unsure of your NetID, visit <https://it.stonybrook.edu/help/kb/finding-your-netid-and-password> for more information. You are responsible for having a reliable computer and Internet connection throughout the term. **Caution!** You will be at a disadvantage if you attempt to complete all coursework on a smart phone or tablet. It may not be possible to submit the files required for your homework assignments. Students should be able to use email, a word processor, spreadsheet program, and presentation software to complete this course successfully. The following list details a minimum recommended computer set-up and the software packages you will need to have access to, and be able to use:

- PC with Windows 10 or higher (we recommend a 3-year Warranty)
- Macintosh with OS 10.11 or higher (we recommend a 3-year Warranty)
- Intel Core i5 or higher
- 250 GB Hard Drive
- 8 GB RAM
- Latest version of Chrome or Firefox; Mac users may use Chrome or Firefox. (A complete list of supported browsers and operating systems can be found on the My Institution page when you log in to Blackboard.)
- High speed internet connection
- Word processing software (Microsoft Word, Google Docs, etc.)
- Headphones/earbuds and a microphone
- Webcam (recommended)
- Printer (optional)
- Ability to download and install free software applications and plug-ins (note: you must have administrator access to install applications and plug-ins).

Technical Assistance:

If you need technical assistance at any time during the course or to report a problem with Blackboard you can:

- Phone: 032-626-0200 (client support, Wi-Fi, software and hardware) or itcenter@igc.or.kr

- Submit a help request ticket: <https://itcenter.igc.or.kr/xefc/egene/login.jsp>
- If you are on campus, visit the Walk-Up Tech Support Station in Bldg. Multicomplex Rm #1015.

Part 2: Course Learning Objectives and Assessments

Upon completion of the course, students will be able to:

- To understand how robotic systems are analyzed
- To gain ability to analyze robotic systems using appropriate tools
- To be able to apply principles of robotics to solve engineering problems
- To be able to design robotic systems based on the analysis of kinematics, dynamics, and control

How to Succeed in this Course:

- Complete all assigned readings in the course
- Review class materials, read advanced textbook proactively, allocate specific time only for this course at least once a day, properly manage your time and resources and understand your work habit and learning style *that will result in success*.
- How much time should YOU devote to an online course? Time on task information, see NY State Education Department:
<http://www.nysed.gov/college-university-evaluation/distance-education-program-policies>

Part 3: Course Schedule

Week	Date	Day & Time	Topic and Student Learning Outcomes	Readings	HW	Due Date
1	02/22	Mon.	Test, HW briefing, Intro.	Chapter 1	N	
	02/24	Wed.	Spatial Description	Chapter 2	N	
2	03/01	Mon.	No class			
	03/03	Wed.	Transformation	Chapter 2	N	
3	03/08	Mon.	Kinematics	Chapter 3	Y	Mon. 03/15
	03/10	Wed.	Inverse Kinematics	Chapter 4	N	
4	03/15	Mon.	Jacobian	Chapter 5	Y	Mon. 03/22
	03/17	Wed.	Dynamics	Chapter 6	N	
5	03/22	Mon.	Dynamics	Chapter 6	N	
	03/24	Wed.	Trajectory Generation	Chapter 7	Y	Wed. 04/05
6	03/29	Mon.	Mid-term Exam 01			
	03/31	Wed.	No class			
7	04/05	Mon.	Mechanism Design	Chapter 8	N	
	04/07	Wed.	Mechanism Design	Chapter 8	N	
8	04/12	Mon.	Mechanism Design	Chapter 8	Y	Mon. 04/19
	04/14	Wed.	Linear Control	Chapter 9	Y	Wed. 04/21
9	04/19	Mon.	Linear Control	Chapter 9	Y	Mon. 04/26
	04/21	Wed.	Nonlinear Control	Chapter 10	N	
10	04/26	Mon.	Nonlinear Control	Chapter 10	N	
	04/28	Wed.	Force Control	Chapter 11	Y	Mon. 05/03
11	05/03	Mon.	Force Control	Chapter 11	N	
	05/05	Wed.	No Class			
12	05/10	Mon.	Mid-term Exam 02			
	05/12	Wed.	Programming	Chapter 12	Y	Mon. 05/24
13	05/17	Mon.	Programming	Chapter 12	N	
	05/19	Wed.	No Class			
14	05/24	Mon.	Mobile Robot		N	
	05/26	Wed.	Mobile Robot		N	
15	05/31	Mon.	Case Study		N	
	06/02	Wed.	Case Study		N	
16	06/07	Mon.	Last class		N	
17	TBD	TBD	Final Exam			

Part 4: Grading, Attendance, and Late Work Policies**Attendance Policy of SUNY Korea**

- All students of SUNY Korea are required to attend every class.
- Unexcused absences will affect seriously the student's final grade in the course.
- If a student has over 20% unexcused absence, the student's final course grade will be an 'F'.

Example)

- If the class is a 150 minute class, and is held once a week, the 4th unexcused absence of a student will lead to an F grade of the course.
 - If the class is a 75 minute class, and is held twice a week, the 7th unexcused absence of a student will lead to an F grade of the course.
 - If the class is a 50 minute class, and is held three times a week, the 10th unexcused absence of a student will lead to an F grade of the course.
 - In Intensive English Course (IEC), if a student misses the class more than 40 hours in a semester, the student will receive an F grade on the course.
- Students should report the reason of absence to the instructor in advance, or immediately after the absence.
 - When a student excuses his/her absence, the student must provide documentation of the reason for the absence to the instructor.
 - The instructor of the course reserves the right to excuse absences.
 - The course instructor may excuse the absence if the submitted documentation fulfills the conditions below.
 - Extreme emergencies (e.g. death in the family)
 - Severe medical reasons with doctor's note (Not a slight illness)
 - Very important events (e.g. national conference, official school event)
 - At the end of semester, the course instructor should submit a copy of the attendance sheet to the Academic Affairs Office.

Assessment and Grading:

Assignment are due before 5 pm on specific dates shown in the course schedule. If the due date falls on an on-line class day, please submit it through email. If it falls on an in-person class date, please bring a hardcopy.

Viewing Grades on Blackboard:

Points and feedback for graded activities will be posted to the My Grades tab in the Tools area of Blackboard. In this course, you will be assessed on the following:

Activity/Assignment	Percentage
Homework	20%
Midterm Exam	30%
Final Exam	50%
Total	100%

Letter Grades:

Final letter grades assigned for this course will be based on the percentage of total point earned and are assigned as follows:

Letter Grade	Points or Percentage
A	90% above
B	80 ~ 89%
C	70 ~ 79%
D	60 ~ 69%
F	Below 60%

Late Work Policy:

I will not accept late work. Late work is not accepted after the closing of each due. Late work only accepted in cases of life-threatening emergency.

Part 5: University and Course Policies**University Policies:****Student Accessibility Support Center Statement:**

If you have a physical, psychological, medical or learning disability that may impact your course work, please contact One-Stop Service Center, Academic Building A201, (82) 32-626-1117. They will determine with you what accommodations, if any, are necessary and appropriate. All information and documentation is confidential.

Academic Integrity Statement:

Each student must pursue his or her academic goals honestly and be personally accountable for all submitted work. Representing another person's work as your own is always wrong. Faculty is required to report any suspected instances of academic dishonesty to the Academic Judiciary. Faculty in the Health Sciences Center (School of Health Technology & Management, Nursing, Social Welfare, Dental Medicine) and School of Medicine are required to follow their school-specific procedures. For more comprehensive information on academic integrity, including categories of academic dishonesty please refer to the academic judiciary website at http://www.stonybrook.edu/commcms/academic_integrity/index.html

Important Note:

Any form of academic dishonesty, including cheating and plagiarism, will be reported to the Academic Judiciary.

Critical Incident Management:

Stony Brook University expects students to respect the rights, privileges, and property of other people. Faculty are required to report to the Office of University Community Standards any disruptive behavior that interrupts their ability to teach, compromises the safety of the learning environment, or inhibits students' ability to learn. Faculty in the HSC Schools and the School of Medicine are required to follow their school-specific procedures. Further information about most academic matters can be found in the Undergraduate Bulletin, the Undergraduate Class Schedule, and the Faculty-Employee Handbook.

Course Policies:**Understand When You May Drop This Course:**

It is the student's responsibility to understand when they need to consider withdrawing from a course. Refer to the Stony Brook Academic Schedule for dates and deadlines for registration:

http://www.stonybrook.edu/commcms/registrar/calendars/academic_calendars
[Undergraduate Course Load and Course Withdrawal Policy](#)
[Graduate Course Changes Policy](#)

Incomplete Policy:

Under emergency/special circumstances, students may petition for an incomplete grade. Circumstances must be documented and significant enough to

merit an incomplete. If you need to request an incomplete for this course, contact me for approval as far in advance as possible.

Course Materials and Copyright Statement:

Course material accessed from Blackboard, SB Connect, SB Capture or a Stony Brook Course website is for the exclusive use of students who are currently enrolled in the course. Content from these systems cannot be reused or distributed without written permission of the instructor and/or the copyright holder. Duplication of materials protected by copyright, without permission of the copyright holder is a violation of the Federal copyright law, as well as a violation of Stony Brook's Academic Integrity.

Online Communication Guidelines and Learning Resources:

Maintain professional conduct both in the classroom and online. The classroom is a professional environment where academic debate and learning take place. I will make every effort to make this environment safe for you to share your opinions, ideas, and beliefs. In return, you are expected to respect the opinions, ideas, and beliefs of other students—both in the face-to-face classroom and online communication. Students have the right and privilege to learn in the class, free from harassment and disruption. The course follows the standards set in the Student Code of Conduct, and students are subject to disciplinary action for violation of that code. If your behavior does not follow the course etiquette standards stated below, the grade you receive for a posting may suffer. I reserve the right to remove any discussion messages that display inappropriate language or content.

Online Etiquette:

- Offensive language or rudeness will not be tolerated. Discuss ideas, not the person.
- Avoid cluttering your messages with excessive emphasis (stars, arrows, exclamations).
- If you are responding to a message, include the relevant part of the original message in your reply, or refer to the original post to avoid confusion;
- Be specific and clear, especially when asking questions.
- Use standard punctuation and capitalization. Using all UPPERCASE characters gives the appearance of shouting and makes the message less legible;
- Remember that not all readers have English as their native language, so make allowances for possible misunderstandings and unintended discourtesies.

Online Classes Require Better Communication:

It is important to remember that we will not have the non-verbal cues that occur in a face-to-face classroom. I cannot see the confused, frustrated, or unhappy expressions on your face if you encounter problems. You **MUST** communicate with me so that I can help. To make the experience go smoothly, remember that you're responsible for initiating more contact, and being direct, persistent, and vocal when you don't understand something.

My Role as the Instructor:

As the instructor, I will serve as a "guide" in our online classroom. While I will not respond to every post, I will read what is posted, and reply when necessary. Expect instructor posts in the following situations:

- To assist each of you when it comes to making connections between discussion, lectures, and textbook material.
- To fill in important things that may have been missed.
- To guide you how to understand course material and how to increase the performance collectively.
- To guide you how to succeed in this class.

Part 6: University Policy Related to COVID-19

Guideline for Students

- Students should wear a mask while on campus.
- Each student is advised to check their health condition and temperature at their home or dormitory before coming to the classroom.
- Anyone who is entering the building should follow the directions in order to check the temperature.
- Each student will need to double-check their temperature at the entrance of the classroom.
- If a student has a fever (37.5°C or higher) or respiratory symptoms, he or she should go back to home or dormitory and report it to the instructor via email.
- Avoid spaces that are highly likely to be dense in buildings, and elevators.
- Hand sanitizers are available throughout the building, so please disinfect your hands frequently.
- Students should make a reservation to use the library, study room, and computer lab and sit on the assigned seats with a sticker.
- Students are responsible for reviewing precautions for the university facility (such as libraries, study rooms, MEC Labs, FIT Labs, Computer Labs, etc.) before they make a reservation to use it.

Precautions

1) Academic Building Access

- Opened:
 - Zone A: B1 Floor (Parking lot entrance)
 - Zone B: 1st Floor
 - Zone C: 1st Floor
- Closed: All the other entrances
- All people entering the Academic Building should wear masks, have their body temperature checked, and use hand sanitizers to disinfect their hands at the entrance.
- All visitors should write their body temperature and contact information on the building access log as well.
- If anyone experiences fever (37.5°C or higher) he or she is required to report it to the staff and leave the campus.

2) School attendance

- If a student experiences fever (37.5°C or higher) or respiratory symptoms (such as coughing, difficulty breathing, etc.), he or she should not come to school and notify the instructor of the fact via email. If the instructor is not reachable, please contact the Academic Affairs or the Department Coordinator.
- For students who have left the class due to suspected symptoms or who are unable to attend the class due to the COVID-19 symptoms, they should not get any disadvantage in attendance score due to the absence of the class.

3) During the class

- Masks should be worn at all times while on campus. Students who do not wear masks should leave the classroom immediately.
- After entering the room, make sure to have as much distance as possible between individuals. If seat movement or temperature check is required, please cooperate.
- Students should use only designated seats in order to maintain the distance between individuals.
- The distance between students should be maintained during group discussions and intermission.
- Students who have fever or respiratory symptoms (coughs, difficulty breathing, etc.) during the class should immediately notify the instructor of the incident and move to the designated classroom for COVID-19.

4) After the class

- Students should not take off their masks outside of the classroom.

5) During supplementary activities

For Library, Study Room, and Study Lounge

- Each department should make a rule to control the number of students who use the study room.
- Students should make a reservation to use the department study room through each department coordinator via email. Students should contact the department coordinator at least 1-week prior to the date they want to use the room. (In the case of using the library study room, students will have to contact the librarian, with equal rules)
- Every student is responsible for cleaning their hands by using hand sanitizer and checking their temperature before entering these university facilities.
- Students with fever, cough or any other symptoms should not use these areas and return to home or dormitory.
- Every student will sign up on a log sheet when they enter the department study room.
- Stickers will be put on desks to indicate available seats in the library and study rooms. If possible, chairs and desks will also be relocated in order for students to keep enough distance.
- Every student should wear a mask while they are staying in the library, study room and study lounge.
- Every student should maintain a social distance of at least 2m while they are staying in the library, study room, and study lounge.

Policy

The University will strive to protect our community during the COVID-19 pandemic and will provide tools to help educate and support established best practices (for instance: distribute facial coverings, post signs, follow cleaning protocols, etc.). Consistent with our [SUNY-Approved Stony Brook COVID-19 Recovery Plan](#), all members of the University community and all visitors/vendors to campus, must follow these safety measures:

- **Public Facial Coverings:**

must be worn at all times in all buildings and when using campus transit. This requirement helps us to protect one another - especially in instances where it is not possible to maintain social distancing (i.e.: in bathrooms, stairwells, elevators, buses, etc.). When outdoors, individuals should maintain a distance of at least six feet from other individuals and use a facial covering when social distancing is not possible. **Limited exemptions** are as follows:

- **Medical Reasons** - employees who are unable to wear facial coverings due to a medical or other health condition should consult with the Office of Equity and Access (OEA). Students should contact the Student Accessibility Support Center (SASC).
 - **Eating/Drinking** - you do not have to wear a facial covering when actively eating or drinking while seated in areas with appropriate social distancing.
 - **Individual Space** - facial coverings can only be removed when alone in a cubicle, office, or other designated areas when following social distancing (includes residence hall rooms/apartments).
 - **Research Laboratory Space** - facial coverings can be removed in controlled laboratory settings provided that the lab has an approved operating plan and all laboratory personnel comply with the plan's safeguards, including social distancing. Facial coverings must be worn when lab personnel cannot maintain a separation of 6 feet or when a procedure requires the use of a particular type of mask or other personal protective equipment (PPE).
- **Social Distancing:** 6 feet of distance must be maintained between individuals at all times. However, in rare instances when social distancing cannot be maintained, interactions should be limited to the shortest time possible (15 minutes or less).
 - **Basic Infection Prevention Measures:** Preventing the spread of COVID-19 is everyone's responsibility - remember to:
 - Wash your hands often with soap and water for at least 20 seconds especially after you have been in a public place, or after blowing your nose, coughing, or sneezing.
 - Use a hand sanitizer that contains at least 60% alcohol if soap and water are not available.
 - Cover coughs and sneezes.
 - Avoid touching your eyes, nose and mouth.
 - Clean and disinfect frequently touched surfaces in your own workspaces daily. This includes tables, desks, phones, keyboards, etc.
 - Avoid use of other people's phones, desks, offices, tools and equipment, when possible.
 - Stay home if you are sick.