University of Michigan
Winter 2022 Instructor Report With Comments
NAVARCH 568 001 - EECS 568 001 - ROB 530 001
Maani Ghaffari Jadidi

85 out of 85 students responded to this evaluation.

Responses to University-wide questions about the course:

	SA	A	N	D	SD	N/A	Your Median	Univ-wide Median	School/College Median
This course advanced my understanding of the subject matter. (Q1631)	58	26	1	0	0	0	4.8	4.6	4.5
My interest in the subject has increased because of this course. (Q1632)	51	27	6	1	0	0	4.7	4.2	4.3
I knew what was expected of me in this course.(Q1633)	44	31	8	1	0	0	4.5	4.6	4.3
I had a strong desire to take this course.(Q4)	53	27	4	0	0	0	4.7	4.1	4.3
As compared with other courses of equal credit, the workload for this course was (SA=Much Lighter, A=Lighter, N=Typical, D=Heavier, SD=Much Heavier). (Q891)	4	6	34	31	9	0	2.6	3.0	2.6

Responses to University-wide questions about the instructor:

	SA	A	N	D	SD	N/A	Your Median	Univ-wide Median	School/College Median
Maani Ghaffari Jadidi seemed well prepared for class meetings.(Q230)	59	19	6	0	0	0	4.8	4.8	4.6
Maani Ghaffari Jadidi explained material clearly.(Q199)	33	35	13	3	1	0	4.2	4.7	4.3
Maani Ghaffari Jadidi treated students with respect. (Q217)	74	10	1	0	0	0	4.9	4.8	4.7

Responses to questions about the course:

	SA	A	N	D	SD	N/A	Your Median
Overall, this was an excellent course. (Q1)	49	27	8	0	0	0	4.6
This course increased my desire to learn more about this subject in the future. (Q32)	53	25	6	1	0	0	4.7
Students felt comfortable asking questions. (Q892)	64	16	2	0	0	0	4.9

Responses to questions about the instructor:

	SA	A	N	D	SD	N/A	Your Median
Overall, Maani Ghaffari Jadidi was an excellent teacher. (Q2)	51	27	6	0	0	0	4.7
Maani Ghaffari Jadidi taught near the class level. (Q212)	44	28	8	5	0	0	4.5
Maani Ghaffari Jadidi acknowledged all questions insofar as possible. (Q216)	62	20	3	0	0	0	4.8

The medians are calculated from Winter 2022 data. University-wide medians are based on all UM classes in which an item was used. The school/college medians in this report are based on classes that are graduate level with enrollment of 75 or greater in College of Engineering.

Written Comments

How would you change this course? (Q907)

Comments
I hope more specific template for homework could be provided. The homework is a little bit too difficult.
Cover some hardware or sensor information
More explanation in Lie Group related material would be better.
I would add some prerequisite courses to this course, for example, taking some lectures related to Kalman Filters. Then I would have more time to teach Lie Algebra and SLAM. Besides, I would change the name of this course to Perceptron in Robotics. It's named Mobile Robotics now, but it has nothing related to control part in robotics.
It would be great if SLAM could somehow be covered before the project proposal deadline so that the teams would learn enough about it and be able to confidently choose it as a potential topic for their projects
Have more mathematical induction instead of just telling us the formula
Projects: Create mixed teams of masters & PhD students. Masters–only teams have fewer leads on research topics that may be applicable for the project.
nil
It would be better to introduce us to the main structure of SLAM at the beginning.
I felt that the project mainly caused me a lot of stress as I struggled to bring in something new to the project. My teammates and I struggled with this as most of us had little to no background. Maybe making the teams in a better manner rather than completely random would be helpful?
Spend more time on SLAM, feels like it was shortchanged at the end.
N/A
Maybe more examples can be given.
Provide more examples in the "mapping" section
Let us form the final project group by ourselves.
Let us decide our group members by ourselves
The latter part of the class gets fairly hand–wavy with a lack of concrete examples on a heavy reliance on images. I think it would be more helpful to cover the math underlying things like ICP, GTSAM, and others instead of just saying they exist and showing videos and images of them working. Additionally, adding a survey of skills, interests and general schedules would greatly help the experience for the group project. My group had very few times that worked for everyone, which made it difficult to meet and discuss. Additionally, 1–2 people ended up doing all of the coding because others didn't have the skills or the investment in the project, so this lead to some frustrations.
I think that randomly assigning project teammates is pretty unfair!!!!! Some people might team with hardworking people, but some might team with those who are not willing to make an effort on the project. That will be very unfair. Although there is a peer evaluation, the overall project results will be affected by those teammates who are not hardworking. I believe letting students who have similar intentions form a team by themselves would make our lives easier...
more team work
HW problems can be described more clearly
Working through examples in lecture would be helpful in knowing how to formulate and code problems.
No suggestions
Nothing comes to mind, the course is very well designed and covers SOTA methods very well. I would maybe consider including how deep learning is or can be coupled with some of the topics that were discussed. Especially with recent developments in the SLAM and robot perception fields, the importance of deep learning is extremely prevalent, and discussing to some extent these topics during the last lecture would be a great preparation towards the future of the area.
More notes and more examples.
Not a lot of the course content link with each other, which makes the course content which is already challenging more difficult to retain.
Including more examples.
Move InEKF to the end, and make that the optional homework. Give an option to opt for additional HW instead of the group project, and/or allow students to pick groupmates.
For some courses materials, I think the professor can use pre–written and revised notes to teach us and write some notes or

Comments
intuition besides during the class. Thus, the professor doesn't need to spend much time writing and can tell students some practical sides or intuition of them. For example, 10–Invariant_EKF_note.pdf and 20_Graph_SLAM_II.pdf.
Course load can be a little lighter in my opinion.
It seems some questions to be answered in the homework are not asked in an obvious way, which makes me sometimes ignore some of them. It would be better if the questions are shown in a more obvious way.
I would reduce the complexity of the project or number of homeworks. It is hard to find time during the semester to work on the project while also doing homeworks.. The project was fun, yet it was difficult to find a novel idea with little foundation in mobile robotics and definitely not enough knowledge about the cutting–edge or current research.
I think I liked the idea of a final project, but I think it was hard to do the final project as well as homework simultaneously. I think maybe having more time to work on the project without an homework would be helpful, or maybe not having a final project. I think also creating bounds on the project topics and scope could help a lot.
It's hard to think of something to change. My last review I asked for more depth, but I don't see how that is possible given the amount of material we cover. Maybe a sequel course that goes over these topics in more detail. Specifically what I am interested in actually using the estimates we find to take action. So, closed–loop consequences is something that I find would be very valuable and deep enough to spend an entire course on.
– Add more prerequisites to the course, including a computer science course. – Have students install ROS at the beginning of the semester. – If you are not going to offer resources for running ROS on Mac, include that in the course description. Either tell students they can't use Mac or give them some resources for what is expected in terms of dual booting/using virtual machines and ideally have the GSIs test if that works. I spent a lot of time trying to figure this out myself and when I could've been working on homework or helping my groupmates with the project. – List in the first lecture or course description that a fair amount of space might be required for using ROS and certain robotics datasets. – With discussions, even though you say it is optional, I felt the need to watch them because they helped clarify the lecture. So it wasn't really optional and it did end up make this class have 6 hours of class time each week. Simply saying it is optional does not change the reality for students. – In office hours, often the GSI would only get to help the first 3–4 people who showed up and would talk with them in a breakout room if they had questions about code. Then, no one else could get answers to questions. Maybe try making an office hours queue, or having one hour be reserved for private/coding questions, and one hour be for general questions anyone can discuss.
I would have enjoyed an overview of SLAM methods in addition to the deep dive on Graph SLAM
Great course.
More frequent, smaller assignments that kept up with lectures.
maybe more detail example on what we are learning and how that can be applied to actual robot
Honestly nothing, I liked the emphasis on the final project as well. Maybe more check up deadlines to keep groups motivated.
I would allocate more of the homework questions on the Invariant EKF to deriving equations for new models rather than applying the results of the derivations directly.

Which aspects of this course were most valuable? (Q908)

Comments
Inviting guest speakers from cutting edge research and providing example codes
Homeworks were good and especially valuable when GSIs provided guidance. Piazza was helpful too.
Give me a different perspective of viewing Robotics: it is more about math instead of coding.
Lie Algebra and SLAM.
Personally, I found the sections related to filtering, state estimation, localization, and SLAM to be the most valuable, as they related the most to my professional interests
We cannot almost find the course content at any other universities. It gives me a brief idea how localization, mapping and SLAM works.
Exposure to cutting–edge topics. Placing the project deadline at a time when pressure from other classes is expected to be low. Placing optional guest lectures on the week leading up to the project deadline.
The concepts covered in the course
These interesting coding tasks.
Learning localization algorithms and real world applications of them, and applying them to homework problems. Jokes by prof were very funny and appreciated.

Comments
SLAM and Lie algebra
The algorithms and coding work.
Graph SLAM
Final project, but hope to have more time to prepare for it.
Final Project
After the interim evaluation, the professor changed significantly to the course structure and made it more reasonable. This kind of practice is quite excellent.
recitation
the final project
HW, project, class
Example code was useful.
Learning frameworks like GTSAM
The project was extremely useful in learning about the implementation of the topics that were discussed. The lectures were also fantastic, reading the material before the lectures vs. after the lectures were drastically different in my understanding, even if I went in thinking that I had an intuitive understanding before attending the lecture.
Cases and examples.
The Lie algebra lectures strengthened my fundamentals
Homeworks is really interesting!
The homework design and structure is awesome.
Assignments, course project.
The lectures, recitations and materials are all very valuable.
Lectures for sure. The slides were very good and Maani is an excellent lecturer.
Class lectures were very informative, and I learned a lot. I also appreciated that slides were posted prior to class so that it was easier to follow along.
Lecture about Lie algebra and Invariant EKF
I think the many actual code implementations proved really helpful to understand how to implement what we learn. I took a class that mentioned GICP before and I would be lying if I said I could implement it after I learned it. I could probably figure it out, but it would take me some time. After we discussed it in this class, I feel confident that I can actually implement it.
– The topics were very cool. – The algorithms actually seem applicable to understanding the field and reading papers. – For the homeworks, having the option to use Matlab or Python was nice. – The professor seems to genuinely care about the content and having students learn. – The staff was responsive to the overall needs of the class and were willing to extend deadlines. They sought student feedback, took it seriously, and acted on it. – The textbooks/homeworks really helped me understand the material. Actually implementing the algorithms is really helpful for figuring out how everything is working.
I really like that it contained all of the lecturing, assignments, projects, recitation, and guest lectures. Having all of these makes the learning better.
Invariant–EKF and SLAM were definitely very interesting to learn about
Recitation part.
I like Maani is always responsive.
Lecture and implementation in homework.
I thought the topics on Lie groups and Lie Algebra were a unique aspect of this course.

Which aspects of this course were least valuable? (Q909)

Comments
None
N/A
All are valuable.
I might be able to do the homework without actually comprehending all the materials of lectures.
nil
I feel we go through some of the topics in the second half–semester in a hurry.
N/A
Nothing.
All were valuable
None.
None
nothing
The lecture slides could at times become a little too convoluted and it would be difficult to identify which topic was in which lecture until deep into looking at multiple lecture slides. I think that some documents that are written as summaries would be very valuable in addition to the slides, but I am aware of how challenging this would be on top of the existing course preparation.
Complicated mathematic formular derivation.
Optimization
Everything seemed really important to me.
I think the final project was not as helpful in learning the material is it could have been.
The group project
Two hours is a long time for lecture. I honestly might've preferred four one hour lectures.
No.
Group Project.
all good topic but I wish we can get more indepth in some topics.

How can Maani Ghaffari Jadidi improve the teaching of this course? (Q901)

Comments
I hope we could spend more time with explaining lie group, better with more intuitive example.
More graphs would be appreciated as some derivation is really hard to catch.
teach slower. Prof. Maani seems to like to teach everything in such a short course.
Prof. Maani generally is a very passionate teacher. It would be better if he can show some mathematical intuition behind each formula instead of just assuming us know that.
Extra explicit examples of IEKF would have been helpful for my understanding.
nil
Maybe more content for optimization–based SLAM.
N/A
He's a very good teacher.
Provide more Office Hour time
Provide more background knowledge material, especially Lie group/Lie algebra. However, overall this is a great course.
Maybe give more concepts and intentions of the topics before teaching them.
by giving hard homework
The project should have some check–in dates that all students must compulsorily attend so that students are not scrambling at the end to finish it. Should these check–ins be graded? may be may be not. But it would help orient and focus the students and help them achieve their goals in a timely manner.
I think it would be very beneficial to have written notes along with the slides. It was mentioned earlier in the semester that some notes might be useful for students, and I think that some documents of the lecture notes would be greatly helpful in better reviewing the material.
More notes and examples.
Find some way to make Lie Groups more comprehensible to the folks who aren't gifted with a talent for abstract high–level mathematics.
For the final project, I think this is good to meet new friends and discuss about the project with them, which improve our teamwork ability. However, everyone pays different attention to this project, which makes this group project just like a personal project. In my case, even if I have written lots of notes to tell people how to install, build, and run the codes step by step, many teammates still do nothing and never ask questions. This situation actually makes me depressed because I cannot find others to discuss how to improve and I can only rely on myself. To avoid this situation, I suggest the professor let students choose teammates instead of assigning randomly. For example, students can describe their interests and what they want to do and post on Piazza to find others. If we can choose our teammates, then we can choose someone wants to do similar tasks, which makes students have more motivation to finish this project.
The concepts of Invariant EKF can use some more simplification to make them easier to digest.
I think providing more resources for learning Lie and Algebra and Invariant EKF would be helpful. I liked that he covered the topic and the lectures were informative, but it was hard to study outside of lecture.
Since the teammates of the group project is randomly chosen, I can't find teammates that interest in the same topic as me. Furthermore, most teammates don't have passion on the project. In fact, I do the literature review, method implementation and results evaluation all alone. Even though there are 5 people in the group, I feel like this is just like a personal project. If we could pick teammates on our own, maybe everything would be different.
I can't think of anything. Professor Maani is amongst the best I have ever had here at Umich.
I personally found the lectures long. maybe meeting 3 times a week with shorter lectures could have worked better for me. The course load was also on the heavier side.
More examples for explaining the algorithms
Have a more cohesive lecture plan.
you are a very good professor! keep it up!
Fairly good! Although I the concept of Lie Algebra and the Log/Exp map was a bit hard to understand at first.