

# Macroethics in Aerospace Engineering Survey – Fall 2022

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Start of Block: Default Question Block

**Title of the Project:** Student Perspectives of Aerospace Engineering Macroethics Issues and Education

**Principal Investigator:** Aaron Johnson, Assistant Professor, Aerospace Engineering Department

By completing and submitting this survey you consent to allow us to use your responses in our research.

**Benefits of Participation:** Although you may not directly benefit from being in this research study, you and future engineering students at the University of Michigan and elsewhere may benefit because the results of this study will help undergraduate engineering instructors to design better macroethics lessons and curricula.

**Risks and Discomforts of Participating:** We believe there are very minimal risk or discomforts from participating in this research study. We will protect the confidentiality of your responses by not collecting any identifiable information through this survey. Your professor will not be informed of your choice to participate or not participate in the research study. They will only see the anonymous responses. Therefore, your choice to participate will have no effect on your course grade. There is a minimal risk that other students may know you choose not to participate in the survey, which is why we are asking you to play on your phone or computer or draw a picture on the paper survey if you choose not to participate.

**Compensation for Participating:** You will not receive any compensation for participating in this research project.

**Confidentiality:** We plan to publish the results of this research study. We will not include any information that would identify you. Your privacy will be protected and your research records will be confidential. If is possible that other people need to see the information you give us as part of the research study, such as organizers responsible for making sure the research is done safely and properly like the University of Michigan or government offices.

**Storage of Data:** Data will be kept for the duration of the project and afterwards because we will not be able to identify to whom it belongs. Any identifying information (such as the specific name and number of the course you are taking) will not be stored with your data. Only the researchers on the project and your instructor will have access to your data, which is anonymous.

**Voluntary Nature of the Study:** Participating in this research study is completely voluntary. You do not have to answer any question you do not want to answer.

**Contact Information for the Study Team:** If you have questions about this research study, you may contact PI Aaron Johnson ([aaronwj@umich.edu](mailto:aaronwj@umich.edu)).

**Continue to Survey:** By moving on to complete this survey, you are indicating that you are at least 18 years old, have read and understood the above information, and agree to participate in this research study. You may access the above information at any time at this website: <https://aaronwj.engin.umich.edu/macroethics-survey-consent/>

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Page Break

End of Block: Default Question Block

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Start of Block: Demographics

As you complete the survey, please remember that you do not have to answer any question you do not want to answer.

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How would you describe your...

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Racial identity?

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Gender identity?

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Sexual identity?

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Do you identify as an active member or veteran of the U.S. Armed Forces, Reserves, or National Guard?

No

Yes

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Are you a U.S. Citizen?

No

Yes

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Are you 25 years of age or older?

No

Yes

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Including this semester, how many semesters have you been in college (at Michigan or elsewhere)?

(If you have been in college more than 12 semesters, select "12" on the slider)

0 1 2 3 4 5 6 7 8 9 10 11 12

Number of semesters ()



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**End of Block: Demographics**

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**Start of Block: Likert**

This survey asks questions about *macroethics*. Macroethics applies to the collective, social responsibility of the engineering profession and societal decisions about technology.

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Please indicate how much you agree with the following statements.

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
Aerospace engineering is a “technical” space where “social” or “political” issues such as inequality are tangential to engineers’ work.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
It is easy to be an ethical engineer in the aerospace industry.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ethical issues do not pertain to new aerospace technologies or systems.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Technology can’t be good or bad in itself. What matters is how people choose to use the technology.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I know of aerospace companies that I wouldn’t consider working for because their practices are unethical.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

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*Display This Question:*

*If Please indicate how much you agree with the following statements. = I know of aerospace companies that I wouldn't consider working for because their practices are unethical. [ Agree ]*

*Or Please indicate how much you agree with the following statements. = I know of aerospace companies that I wouldn't consider working for because their practices are unethical. [ Strongly agree ]*

Q11 What are the aerospace companies' practices that you consider to be unethical?

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Please indicate how much you agree with the following statements.

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
In my engineering coursework thus far there has been a substantial emphasis on macroethics in aerospace engineering.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
As a whole, my professors have avoided discussions of macroethical issues.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
In my classes, I have often had the opportunity to initiate discussions regarding macroethical issues.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Undergraduate engineering students are able to learn about macroethics.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
My professors have rarely expressed personal concern over macroethical issues in aerospace engineering.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I wish there was more emphasis on	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

macroethics in aerospace engineering in my engineering coursework.

The ethical curriculum I have received so far has prepared me to engage in respectful and challenging dialogue with my peers.

I feel prepared to consider macroethical issues in the aerospace industry today.

My aerospace professors have the knowledge necessary to teach me about macroethics in our classes.

End of Block: Likert

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Start of Block: Block 3

I am personally concerned about being treated differently in aerospace engineering spaces because of some aspect of my identity (Please check all that apply):

- Race/ethnicity
- National origin
- Gender identity or expression
- Sexual orientation
- Disability status
- Veteran status
- Political affiliation
- Age
- Religion / creed
- Other (please specify below)
- None of the above

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*Display This Question:*

*If I am personally concerned about being treated differently in aerospace engineering spaces because... = Other (please specify below)*

Please specify:

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What aspects of people's identity do you believe are marginalized within aerospace engineering spaces? (Please check all that apply)

- Race/ethnicity
- National origin
- Gender identity or expression
- Sexual orientation
- Disability status
- Veteran status
- Political affiliation
- Age
- Religion / creed
- Other (please specify below)
- None of the above

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*Display This Question:*

*If What aspects of people's identity do you believe are marginalized within aerospace engineering sp... = Other (please specify below)*

Please specify:

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Page Break

What do you know about Wernher von Braun? (Please check all that apply)

- He was the father of American rocketry.
- He designed the Saturn V.
- He was German.
- He was a Nazi.
- He used concentration camp forced labor to build V-2 rockets.
- None of the above

All of these facts about Wernher von Braun in the previous question are true. Given that, please tell us how much you agree with the following statements:

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
In 1945, the U.S. should not have put von Braun in charge of the rocket development.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Today, we should rename indoor arenas and awards named after von Braun.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

End of Block: Block 3

Start of Block: Block 4

In what courses at Michigan have you learned about macroethics in engineering?

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What does the phrase “Diversity in aerospace engineering” mean to you?

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The major U.S. aerospace companies make most of their revenue on defense-related systems. (For example, Lockheed Martin’s revenue is 96% defense, and Boeing’s is 56% defense. See <https://people.defensenews.com/top-100/> for more information).

How do you feel about the fact that so much of the aerospace industry is involved in national defense?

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Who, if anyone at all, do you think should regulate the mining of the moon and asteroids by private, for-profit companies?

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Satellite megaconstellations are systems that provide satellite internet through a group of orbiting satellites. SpaceX has currently launched 1,800 of their planned 4,000+ Starlink satellites, and Amazon is developing their own megaconstellation, called Project Kuiper, with 3,000+ satellites.

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Have you heard of satellite megaconstellations before?

- No
  - Yes
- 

Name up to 3 effects of a satellite megaconstellation and indicate whether you feel each effect is positive or negative for society.

	What is the effect?	What is the result for society?
	(1)	

#1 (1)		▼ Positive (1 ... Negative (2)
#2 (2)		▼ Positive (1 ... Negative (2)
#3 (3)		▼ Positive (1 ... Negative (2)

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What does it mean to be an ethical aerospace engineer?

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End of Block: Block 4

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