

# CMSC 304 Computer Ethics

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*Slides adapted from Dr. E. Birrane, with thanks*

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## Bookkeeping

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- Computing Success Center
  - <https://academicsuccess.umbc.edu/computing-success-center/>
  - AOK Library, 1st Floor
  - Tutors for 304 (and other classes) available
- Grading:
  - EA 1 is done and will be released soon
  - Working on readings
- Today: all about argumentation
- Next time: app development
  - We will have an in-class exercise, bring computers

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## Agenda

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- Valid Arguments
- Deductive and Non-Deductive Argumentation
- Argumentation Styles
- Argumentation Applied to Ethical Theories
- Common Fallacies

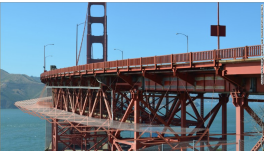
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## Normative Argumentation

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- Let's argue about something...
  - **Should there be an anti-suicide screen on the golden gate bridge?**
- What are some arguments against?
  - Aesthetic
  - Effectiveness
  - Economic
  - Autonomy
  - Responsibility



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## Normative Argumentation

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- Let's argue about something...
  - **Should there be an anti-suicide screen on the golden gate bridge?**
- Multiple arguments against (with rebuttal)
  - **Aesthetic** – A barrier destroys the renowned view.
    - We can make the barrier pretty.
  - **Effectiveness** – Where there is a will, there is always a way
    - Suicide is impulsive. Even small obstacles save lives.
  - **Economic** – \$50m barrier for only 25 lives/year? Too costly.
    - Poor economic valuing of human lives. What if it was your family member?
  - **Autonomy** – It's wrong to interfere with someone's choice to die.
    - Suicide is impulsive. May involve mental illness. Both impede autonomy.
  - **Responsibility** – It is not our job to prevent suicides. Why us?
    - If you own the instrument of suicide, you own preventing its use in that way.
- Arguing is **affirming or refuting statements**

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## Argumentation Theory

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- Argument?
  - **A set of statements, logically connected**
  - The conclusion of previous statements are premises of the next.
  - $P_1, P_2, \dots, P_n, \text{ so } C$
- Conclusion (C) of an argument?
  - **The statement confirmed based on the premises.**
  - Generally, the last statement in the list
- Premises ( $P_1, P_2, \dots, P_n$ ) of an argument?
  - Those statements which provide support or reasons for accepting the conclusion.

$A \rightarrow B$	$B \rightarrow C$	$\frac{A}{\therefore C}$

Stealing is wrong

**Piracy is stealing**

**$\therefore$  Piracy is wrong**



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### Two kinds of argument...

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- Rhetorical Arguments
  - Does it persuade an audience.
  - To be *proved right* is more important than to be *right*.
  - We generally leave this to salespeople and politicians.
  - Sophist / Sophistry
    - Modern usage: One who uses rhetoric to deceive. "To make the weaker argument the stronger"
- Logical Arguments
  - Also known as "valid arguments"
  - This is what we focus on as engineers.
  - Conclusion follows from the premises:
    - If the premises are true, the conclusion must be true.

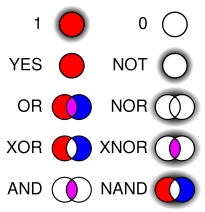



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### Forms of valid arguments

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- Modus Ponens:
  - 1: if p, then q. 2: p. 3: q.
  - 1) If it rains, I will stay home.
    - p == "it rains". q == "I will stay home"
  - 2) It rains.
  - 3) I will stay home.
- Standard IF statement.

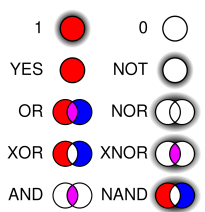


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### Forms of valid arguments

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- Modus Tollens:
  - 1: If p, then q. 2: !q. 3: !p
  - 1) if it rains, I will stay at home:
    - p == "it rains". q == "I will stay home"
  - 2) I will not stay at home (!q)
  - 3) It is not raining (!p)



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### Fallacies and Challenges

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- Fallacy: An error or deficiency in an argument
  - If it rains, I will stay at home ( $p \rightarrow q$ )
  - I will stay at home (given q)
  - It rains. (therefore, p)
- Challenges
  - Check argument **validity**.
    - If the argument is invalid (conclusions do not follow from the premises) you can challenge the conclusion.
  - Check the premises.
    - If any are bad/false, then the conclusion can be challenged: it is **unsound**.
  - If the argument is valid and the premises are true, you can't challenge the conclusion.
    - Because that's how logic works.

$$a = b$$

$$a^2 = ab$$

$$a^2 - b^2 = ab - b^2$$

$$(a+b)(a-b) = b(a-b)$$

$$a+b = b$$

$$2b = b$$

$$2 = 1$$

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### Valid vs. Sound

	Premises are true, conclusion follows	Premises are false, but conclusion follows
Valid	Sound All people are mortal I am a person ∴ I am mortal	Unsound All people are vampires I am a person ∴ I am a vampire
Invalid		All vampires are people I am a person ∴ I am a vampire


Premises are false, and conclusion doesn't follow

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### Deductive Argumentation

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- Deductive
  - The conclusion is completely enclosed within the premises.
  - The conclusion cannot add information.
    - Consider your favorite mathematical proof
- Deductive Argumentation leads to "Valid" Arguments.
  - Valid argument:** If you accept the premises, you MUST accept the conclusion.
    - Because the conclusion is captured in the premises.
    - Deduction goes from the general to the specific.
- Valid arguments lead to sound arguments
  - Arguments is valid **and** premises are true.
- Are all arguments deductive?
  - If not, what is an example of a non-deductive argument?



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### Deductive Argumentation

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- The book's discussion on non-deductive argumentation and sound arguments confuses terminology.
- These slides override the textbook.
- Non-Deductive Argumentation
  - The conclusion is not fully captured in the premises.
  - Premises provide reasons why the conclusion is *plausible*.
  - Conclusions can be affected by adding new premises
    - This is not the case in deductive arguments.

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### Inductive Argumentation

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- Inductive Argumentation
  - Starting with specifics and then making more general.
  - Opposite "direction" of a deductive argument
    - Whenever the grass is wet, it has rained. Therefore, rain always causes wet grass.
    - Jennifer leaves for school at 7:00 a.m. Jennifer is always on time. Jennifer concludes, then, that she will always be on time if she leaves at 7:00 a.m.
    - Every observed morning, the sun has risen. Therefore, the inductive conclusion is that the sun will rise every subsequent morning.
  - Is this guaranteed to be true?




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### Abductive Argumentation

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- Abductive Argumentation
  - Seek simplest explanation to match observations.
  - Inference to the best explanation.
    - The grass is wet. You conclude that it rained.
    - You wake up in the morning, and you head downstairs. In the kitchen there's a plate on the table, and a bowl with a little milk left in it. You conclude via abduction that the explanation for this is that your housemate awoke before you, had their breakfast, and left.
    - Shalini notices that Jennifer is late. She *abduces* that Jennifer did not leave her house at 7:00.
  - Again, not guaranteed to be accurate.



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### How these tie together

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**Deductive & Inductive decision tree**

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    graph TD
      A[Deductive] --> B[valid or invalid]
      A --> C[sound or unsound]
      B --> D["1. must be a valid argument and 2. must have true premises and a true conclusion."]
      C --> E["All INVALID arguments are UNSOUND!"]
      F[Inductive] --> G[strong or weak]
      F --> H[cogent or uncogent]
      G --> I["1. must be a strong argument and 2. must have true premises and a true conclusion."]
      H --> J["All WEAK arguments are UNCOGENT!"]
    
```

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### Argumentation by Analogy

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- Draw conclusions from analogies.
  - Situation *q* is comparable to situation *p*.
  - If situation *p* occurs, then *r* applies.
  - So, if situation *q* occurs, then *r* also applies.
- Chocolate is poisonous to dogs, ∴ chocolate is poisonous to cats.
- Ask 3 Critical Questions
  - Are there similarities between *p* and *q*, relevant to *r*?
  - Are there differences between *p* and *q*, relevant to *r*?
  - Do similarities dominate?

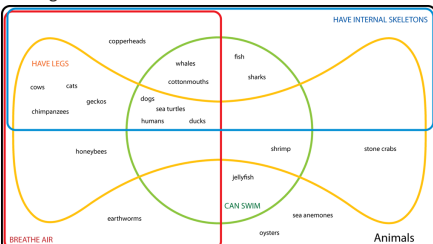


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### Argumentation by Analogy

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- Consider the Venn Diagram: are cats like...
  - Sharks?
  - Oysters?
  - Honeybees?
  - Worms?
  - Depends on *r*...



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## Argumentation by Analogy


- Textbook example:
  - Ethical hacking is like setting off a fire for the sake of fire safety training.

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## Means-End Argumentation

- If you wish X, then you must do Y.
  - X is the desired end state.
  - Doing Y will yield X
  - So,... do Y.
- Critical Questions
  - Does Y really yield X?
  - Can someone actually do Y?
  - Does Y have other side effects?
  - Are there better (efficient?) ways to get X?
  - Do we even want X at the cost of side-effects?
- Consider technological enthusiasm?
  - Did the end justify the means for Von Braun?
  - Uber?
  - Someone has to evaluate the "end"




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## Causality Argumentation

- A specific consequence can be expected from a specific action.
  - Deductive Arguments:
    - Let p be the action. Let q be the expected consequence. p happens.
    - p causes q, q happens, ∴ q happens.
  - Non-Deductive Arguments
    - There exists an action p. "p is thought to cause q" (causality premise), p happens.
    - p likely causes q, p happens, so q probably happens.
- Critical questions
  - Does p really imply q?
    - Do we have examples of p happening and q not happening?
    - Could something we forgot about or missed be causing q instead?
  - Do we really know what q is?
    - Can we assess the impact/consequence of q?




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## Proof from the Absurd (or Counterexample)

- Assume something and show that it leads to something absurd.
  - Assume A and show something impossible happens.
  - Then, !A must be correct, instead.
- Critical Questions
  - Does assuming A lead to inconsistency?
  - Do we know what !A really is?
    - Does  $A = \neg(\neg A)$ ?
    - Easy in math.
    - Hard in other "stuff".
- Example:
  - Let's say this square is a 1. Is that true?
  - What about a 5? Or an 8?
  - What is !1 in this case?



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## Characteristic-Judgement Argumentation

- If you have a certain set of characteristics, then judgment A is justified for that person or thing.
  - X has characteristics s1, s2, s3...
  - Characteristics s1, s2, s3 are typical of A
  - A applies to X.
- Critical Questions
  - Do the characteristics mentioned justify judgment A?
  - Are the characteristics all typical of A?
  - Are other, not mentioned, characteristics also necessary for A?
  - Does X possess the characteristics that justify the judgement not A?
- Consider...
  - WWJD?
  - The advisory nature of super heroes, protagonists.

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## Mapping to Ethical Theories

- Utilitarianism
  - Means-End Argumentation
    - The end is the consequence, and utilitarianism is a form of consequentialism.
    - Especially good for the ideals of Tech. Enthusiasm and Efficiency/Effectiveness.
- Kantian Theory
  - Causality Argumentation
  - Proof from the Absurd
    - Consider the formulations of the categorical imperative. See if things lead to a contradiction.
- Virtue Ethics
  - Characteristic-Judgement reasoning. If a virtuous person does it, then it must be moral.
  - Analogy Argumentation.
    - Show things are analogous to virtuous things/people.

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## Fallacies

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- What is a fallacy?
  - It is a flaw in an argument.
  - Seems correct but on examination is not.
  - Not necessarily an attempt to deceive or mislead.
- Types of Fallacies
  - **Formal Fallacies:** Any invalid deductive argument
    - The conclusion does not follow from the premises.
  - **Informal Fallacies:** Errors interpreting premises or critical questions
    - Apply to non-deductive argument.
    - Prevent a non-deductive argument from being a sound argument.
- Informal Fallacies
  - We will go over the 7 listed in the text. There are A LOT more of them.

www.miles.com/ethics/notes/notes-on-fallacies.html

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## Informal Fallacies

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- Attack on the Person (Ad Hominem)
  - Separate the argument from the arguer.
- Straw Person
  - Invent a weaker argument (often an extreme version) and claim that as your opponent's argument.
- Confusion of Law and Ethics
  - Not everything legal is ethical.

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## Informal Fallacies

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- Wishful Thinking (Fallacy of Desire)
  - Believing something because you really want it to be so.
- Appeal to the People (Ad Populum)
  - Something is true because lots of people think it is true.
- Naturalistic Fallacy
  - Only natural things are good. Ought from is.

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## Informal Fallacies

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- The Privacy Fallacy
  - If I have done nothing wrong, I have nothing to hide.
  - Everyone has things they would rather not share with everyone.
  - This really means "I haven't done anything that I think anyone will come after me about."
- Ambiguity
  - Being technically correct while leaving an incorrect impression.
  - Also called an equivocation.
    - The captain was sober today.

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## Class exercise

- For Ethical Analysis 1:
- **What were your premises? What did you conclude?**
- Deductive, inductive, abductive arguments?
- Strength of premises?
- Valid and/or sound arguments?
- Occurrence of common fallacies?

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## For next time: App Development

- Do readings and journals
- Bring computers to class!

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