

PHI 489 LEC

Ontology Engineering and Intelligence Analysis

Semester, Year

3 Credits

**Meeting Pattern**

2 meetings per week, 1:20 minutes per meeting

| Instructor | Email | Office Location & Hours |
| --- | --- | --- |
| **John Beverley** | [johnbeve@buffalo.edu](mailto:johnbeve@buffalo.edu) | 107 Park Hall, T 9-11am |

## Course Description

## This course integrates foundational principles of ontology engineering with contemporary research in intelligence analysis. To that end, we explore ontological dimensions that inform intelligence methodologies, addressing fundamental questions related to knowledge, truth, ethics, and decision-making within this domain.

## The curriculum anchors theoretical concepts in practical intelligence contexts, transforming abstract ideas into actionable tools for analyzing and enhancing intelligence operations. Students will engage critically with a diverse array of topics, including the implications of digital warfare, the nature of cybersecurity in the global sphere, the ontology of terrorism, and the ethical considerations of artificial intelligence in espionage.

## Students will develop a nuanced understanding of innovative applications of semantic web tools, ontologies, and knowledge graphs to intelligence analysis. The goal is for students to emerge with the ability to not only grasp but also critically evaluate and contribute to ongoing discussions and developments in the field. By the end of the course, students will be well-prepared to formulate and advocate their own informed perspectives on pressing intelligence issues.

## Learning Outcomes

| Outcome | Method of Assessment |
| --- | --- |
| Critically evaluate the core literature and central debates straddling the intersection of ontology engineering and intelligence analysis. | DQ, Participation |
| Conceptualize and advocate ontologically-informed perspectives on pressing intelligence issues, showcasing innovation and depth. | DQ, Participation |
| Demonstrate an in-depth understanding of the ontological underpinnings that inform intelligence paradigms. | DQ |
| Analyze how classical theoretical constructs can be integrated into contemporary intelligence analysis frameworks. | DQ, Participation |
| Identify the ways in which ethical, ontological, and epistemological challenges emerge within intelligence operations and decision-making. | DQ, Participation |
| Employ logical reasoning to critique, adapt, and enhance current intelligence methodologies. | Writing |

## Required Text(s) & Materials

* See schedule below.

## Course Requirements

* Students will be expected to attend and participate in class discussions.
* Students will be expected to complete biweekly writing assignments.
* Students will be expected to submit one final paper draft (appr. 2500 words)
* Students will be expected to submit one final paper (appr. 2500 words)

## Grading Policy

|  |  |
| --- | --- |
| **Weighting** | **Assessment/Assignment** |
| 35% | Attendance and Participation |
| 20% | Weekly Discussion Board |
| 15% | Final Paper Draft |
| 30% | Final Paper |

*Discussion Board*

Approximately every week students will be expected to submit to a discussion board (no more than 500 words). Students will be given time during class to complete and submit these assignments.

The discussion board will be designed to – over the course of the semester – aid students in the crafting a sophisticated, well-argued, final paper. For example, one of the initial writing assignments will have students focus on defining challenging terminology.

Discussion boards will be graded based on argumentation, understanding of intelligence analysis literature discussed in class, paper structure, clarity, and creativity.

Discussion boards are to be submitted electronically through Brightspace. Citations must follow a consistent format.

Late discussion boards will not be accepted; students will not receive credit if the deadline is missed.

*Attendance and Participation*

In my experience, attendance is vital to mastering the material covered during this course. With that in mind, I require students attend each class session, and incorporate this requirement into each student’s grade. There are two components to the grade: attendance and participation.

Students may have valid reasons for missing classes, including military duties, religious commitments, health issues verified by a physician or qualified healthcare provider, among other things. You must inform me at least 48 hours in advance via email, when feasible. I will determine what constitutes a fair amount of work to compensate for your absence. Please see the UB policy on excused absences for more details: <https://catalogs.buffalo.edu/content.php?catoid=1&navoid=19&hl=absence&returnto=search>

With respect to attendance, you are allowed to miss two sessions without penalty and without an excuse. For each class session missed beyond two, I will deduct 2% from your grade (up to 35%).

With respect to participation, I intend to follow the rubric below:

* 90-100% - Regularly contribute to class discussions with insightful and relevant comments. Engage constructively with peers.
* 80-89% - Frequently participates in class discussions. Shows a good understanding of course material.
* 70-79% - Participates in class but contributions are less frequent. Understands basic concepts but does not demonstrate good understanding of the course material.
* 60-69% - Rarely participates in class discussions. Contributions show minimal understanding of the course content.
* 0-59% - Does not participate in class discussions or contributions are off-topic or disruptive. Shows little to no understanding or engagement with the course material.

Accordingly, it will serve you well to be prepared to discuss the course content when you arrive each day, that is, complete the readings and assignments, and be ready to engage in discussions.

*Events*

Ontology engineering is a thriving discipline with cutting edge research conducted in various quarters at a rapid pace. Established ontology events are listed in the schedule as opportunities to broaden your exposure to the field. Many of these events will be offered remotely.

The instructor will arrange to have students permitted to participate in these events during normal course meeting hours. Students will not be expected to pay to attend these events and they will not be expected to participate more than the allotted normal course time. Students may, of course, participate in the full event, however.

Minimal attendance at events of the sort described above, counts towards participation and attendance credit. For further questions, please reach out to the instructor.

*Paper Draft*

Students will also be given class time to craft a draft of their final paper; students will be expected to submit their paper draft by the end of this class period (see outline below for specific date). Students will be allowed, and are encouraged, to work on this draft prior to class. Doing so will likely result in a better paper.

The paper draft will be graded based on viability of the paper topic, argumentation, proper use of intelligence analysis methodologies discussed in class, paper structure, clarity, and creativity.

Papers are to be typed, double-spaced, and submitted electronically through Brightspace. Citations must follow a consistent format.

Late final paper drafts will not be accepted; students will not receive credit if the deadline is missed.

*Final Paper*

Students will submit a final paper of approximately 2500 words on the topic chosen by the student during the final paper draft assignment, unless otherwise directed by the instructor.

The final paper will be graded based on viability of the paper topic, argumentation, proper use of intelligence analysis methodologies discussed in class, paper structure, proper citations, clarity, and creativity.

Papers are to be typed, double-spaced, and submitted electronically through Brightspace. Citations must follow a consistent format.

Late final papers will not be accepted; students will not receive credit if the deadline is missed.

*Incompletes*

A grade of incomplete (“I”) indicates that additional course work is required to fulfill the requirements of a given course. Students may only be given an “I” grade if they have a passing average in coursework that has been completed and have well-defined parameters to complete the course requirements that could result in a grade better than the default grade. An “I” grade may not be assigned to a student who did not attend the course. Prior to the end of the semester, students must initiate the request for an “I” grade and receive the instructor’s approval. Assignment of an “I” grade is at the discretion of the instructor.

## Grading Chart

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Letter Grade** | **Points** | **Letter Grade** | **Points** | **Letter Grade** | **Points** |
| A | 93%-100% | B- | 80%-82.9% | D+ | 65%-69.9% |
| A- | 90%-92.9% | C+ | 77%-79.9% | D | 60%-64.9% |
| B+ | 87%-89.9% | C | 73%-76.9% | F | < 60% |
| B | 83%-86.9% | C- | 70%-72.9% |  |  |

## Schedule

| Week | Topic | Readings | Assignment |
| --- | --- | --- | --- |
| Week 1 | * Foundations | * [National Security Intelligence Activity: A Philosophical Analysis](https://www.tandfonline.com/doi/epdf/10.1080/02684527.2022.2076329?needAccess=true) * [Ontology for the Intelligence Analyst](https://apps.dtic.mil/sti/tr/pdf/ADA591720.pdf) * Design Patterns 101 (**pdf provided in Brightspace**) |  |
| Week 2 | * Intelligence Analysis: Top-Down | * [Philosophical Foundations of Intelligence Collection and Analysis](https://philarchive.org/archive/SMIPFO-4) * [Rethinking Intelligence Practices and Processes](https://www.tandfonline.com/doi/full/10.1080/02684527.2022.2113679?src=recsys) * Design Patterns 102 (**pdf provided in Brightspace**) |  |
| Week 3 | * Intelligence Analysis: Top-Down | * [Aboutness: Towards Foundations for the Information Artifact Ontology](https://ceur-ws.org/Vol-1515/regular10.pdf) * [Document Acts](https://ontology.buffalo.edu/smith/document-acts.pdf) * [On Credentials](https://www.degruyter.com/document/doi/10.1515/jso-2019-0034/html) * [Ontology of Information Artifacts in the Intelligence Domain](https://philpapers.org/archive/SMII-16.pdf) | Presentation |
| Week 4 | * Intelligence Analysis: Bottom-Up | * Whitesmith, Part 1 (**pdf provided in Brightspace**) * [Understanding Bias in Twitter-Based Intelligence Analysis](https://ieeexplore.ieee.org/document/10345941) * [Ontology and Cognitive Outcomes](https://arxiv.org/pdf/2005.08078.pdf) | Presentation |
| Week 5 | * Intelligence Analysis: Bottom-Up | * Whitesmith, Part 2 (**pdf provided in Brightspace**) * [Towards Handling Bias in Intelligence Analysis with Twitter](https://ieeexplore.ieee.org/abstract/document/10302618?casa_token=nH21mS5x4MIAAAAA:rjE4RrAbEu8PrlZtB1bvIwQ7XOwx8GcSTHvfGcyHidUB7593ZZ0uHJsx74_aRuILO8BFvT7sTg) | Presentation |
| Week 6 | * Military Intelligence Part 1 | * [Joint Doctrine Ontology](https://stids.c4i.gmu.edu/papers/STIDS_2015_T01_Morosoff_etal.pdf) * [Command and Control](https://philpapers.org/archive/TOLCAC.pdf) | Presentation |
| Week 7 | * *ONTOBRAS EVENT* |  |  |
| Week 8 | * Fall Break |  | Presentation  Final Project Format |
| Week 9 | * *STIDS EVENT* |  |  |
| Week 10 | * Military Intelligence Part 2 | * [Complexity in Military Intelligence](https://www.tandfonline.com/doi/full/10.1080/08850607.2023.2209493?src=recsys) | Presentation |
| Week 11 | * Cybersecurity Domain | * [Ontology for ATT&CK](https://dl.acm.org/doi/pdf/10.1145/3577923.3585051) * [Cybersecurity Knowledge Graphs](https://link.springer.com/article/10.1007/s10115-023-01860-3) * [A Common Core-Based Cyber Ontology for Support of Cross-Domain Situational Awareness](https://www.spiedigitallibrary.org/conference-proceedings-of-spie/10635/106350F/A-common-core-based-cyber-ontology-in-support-of-cross/10.1117/12.2307719.full) * [Toward a Knowledge Graph of Cybersecurity Countermeasures](https://d3fend.mitre.org/resources/D3FEND.pdf) | Presentation |
| Week 12 | * External and Internal Threats | * [An Ontological Framework for Understanding the Terror-Crime Nexus](https://www.casede.org/BibliotecaCasede/SOF_RoleCombatingTOC.pdf#page=157) * [A Simple Ontology for the Analysis of Terrorist Attacks](https://digitalrepository.unm.edu/cgi/viewcontent.cgi?article=1040&context=ece_rpts) * [An Insider Threat Indicator Ontology](https://apps.dtic.mil/sti/pdfs/AD1128874.pdf) | Presentation |
| Week 13 | * Ontology of Secrets | * [Falsehoods Programmers Believe](https://github.com/kdeldycke/awesome-falsehood) * [Lies and Deception: An Unhappy Divorce](https://www.jstor.org/stable/24671096) | Presentation |
| Week 14 | *THANKSGIVING BREAK* |  |  |
| Week 15 | * Ontology of Secrets | * [The Logic of Secrets](https://link.springer.com/article/10.1007/s10472-022-09815-0) * [Commonsense Theory of Secrets](https://ebooks.iospress.nl/volumearticle/55796) | Presentation Final Project |

## Academic Integrity

Academic integrity is critical to the learning process. It is your responsibility as a student to complete your work in an honest fashion, upholding the expectations your individual instructors have for you in this regard. The ultimate goal is to ensure that you learn the content in your courses in accordance with UB’s academic integrity principles, regardless of whether instruction is in-person or remote.  Thank you for upholding your own personal integrity and ensuring UB’s tradition of academic excellence. The academic integrity policy is available at [buffalo.edu/academic-integrity.](https://ubcms-author.buffalo.edu/content/undergrad/faculty-staff-pw/curriculum/course/buffalo.edu/academic-integrity)

## Course Policy on the use of Artificial Intelligence

Please see guidance on the use of AI tools in academic work here: <https://www.buffalo.edu/academic-integrity/about/artificial-intelligence.html>

## Accessibility Resources

If you have any disability which requires reasonable accommodations to enable you to participate in this course, please contact the Office of Accessibility Resources in 60 Capen Hall, 716-645-2608 and also the instructor of this course during the first week of class. The office will provide you with information and review appropriate arrangements for reasonable accommodations, which can be found on the web at: <http://www.buffalo.edu/studentlife/who-we-are/departments/accessibility.html>.

**Protecting Course Materials Disclaimer**

All materials prepared and/or assigned by me for this course are for the students’ educational

benefit. Other than for permitted collaborative work, students may not photograph, record,

reproduce, transmit, distribute, upload, sell or exchange course materials, without my prior

written permission. “Course materials” include, but are not limited to, all instructor-prepared and assigned materials, such as lectures; lecture notes; discussion prompts; study aids; tests and assignments; and presentation materials such as *PowerPoint* slides, *Prezi* slides, or transparencies; and course packets or handouts. Public distribution of such materials may also constitute copyright infringement in violation of federal or state law. Violation of this policy may additionally subject a student to a finding of “academic dishonesty” under the Academic Integrity Policy and/or disciplinary charges under the Student Code of Conduct.

## Counseling Services

Students may experience a range of issues that can cause barriers to learning or reduce their ability to participate in daily activities. These might include strained relationships, anxiety, high levels of stress, alcohol/drug problems, feeling down, health concerns or unwanted sexual experiences. Counseling, Health Services, and Health Promotion are here to help with these or other concerns. Students can learn more about these programs and services by contacting:

* **Counseling Services:** 120 Richmond Quad (North Campus), phone 716-645-2720 and 1st Floor Michael Hall (South Campus), phone: 716-829-5800
* **Student Health Services:** 4350 Maple Rd., Amherst, NY 14226, phone: 716-829-3316
* **Health Promotion**: 114 Student Union (North Campus), phone: 716-645-2837

## Sexual Violence

UB is committed to providing a safe learning environment free of all forms of discrimination and sexual harassment, including sexual assault, domestic and dating violence and stalking. If a student has experienced gender-based violence (i.e., intimate partner violence, attempted or completed sexual assault, harassment, coercion, stalking, etc.), UB has resources to help. This includes academic accommodations, health and counseling services, housing accommodations, helping with legal protective orders, and assistance with reporting the incident to police or other UB officials if the student so chooses. Contact UB’s Title IX Coordinator at 716-645-2266 for more information. For confidential assistance, students may also contact a Crisis Services Campus Advocate at 716-796-4399.