MARYLAND APPLIED GRADUATE ENGINEERING

Network Automation (ENPM818F)
TENTATIVE SYLLABUS

Term: *Fall 2026*
Professor: Raissi-Dehkordi, Majid
Pronouns: ###
Office Phone: ###
Email: ###
Office Hours: ###

Credits: 3
Course Dates: From Aug 25, 2026 - Dec 15, 2023
Course Times: TBD
Classroom: TBD

Course Description

Network infrastructure has long been managed through manual, CLI-driven processes — an approach that is increasingly incompatible with the scale, complexity, and velocity demands of modern IT environments. Human error, configuration inconsistency, and the sheer volume of devices in today's networks make manual operations a liability rather than a methodology. Network Automation directly addresses this reality by empowering engineers to leverage software to configure, orchestrate, and manage network infrastructure with precision, repeatability, and speed. This course offers a comprehensive, deeply hands-on journey through the full spectrum of network automation — from foundational scripting with Python and Netmiko, through structured data modeling with YANG, YAML, and JSON, to industry-standard automation protocols including NETCONF, RESTCONF, and gRPC. Students will work directly with real automation frameworks such as Ansible and NAPALM to achieve network-scale configuration management, explore Software-Defined Networking paradigms, and develop the skills needed for automated network monitoring, observability, and remediation using well-known network monitoring tools. Rather than focusing on theory alone, the course is built around a progressive, project-based model in which students design a target network architecture from the ground up and incrementally automate its orchestration, configuration, and management across successive modules against real network operation systems, simulating the workflows of a modern network automation engineer. By the end of this course, students will have not only a solid conceptual understanding of automation principles and protocols, but a working portfolio of automation solutions and the practical confidence to apply them in professional network environments.

Prerequisites

- Solid understanding of network protocols principles and configuration through ENPM694 or ENPM818O
- A working knowledge of Python, or demonstrated programming experience in any language with the ability to pick up Python syntax and concepts quickly.

Learning Outcomes

After successfully completing this course, you will be able to:

- **Design and implement automated network configuration workflows** using Python-based tools and frameworks — including Netmiko, NAPALM, and Ansible — to configure and validate network devices at scale.

- **Define and apply industry-standard automation protocols and data models** — including NETCONF, RESTCONF, gRPC, and YANG — to programmatically configure and manage network infrastructure in a structured manner.
- **Build and maintain network-scale configuration management systems** using templating, data serialization formats (YAML, JSON, XML), and orchestration playbooks that enforce consistency, repeatability, and compliance across the network.
- **Understand and operate network monitoring and observability tools** using both classical and automated approaches — including SNMP, syslog, streaming telemetry, and well-known network monitoring tools — to detect, report, and remediate network issues automatically.
- **Architect and deliver a complete end-to-end network automation project** that integrates configuration management and monitoring concepts, demonstrating the ability to apply automation principles to real-world network engineering challenges on real networks.

Course Materials

Required Resources

- Book: TBD
- Application/Software: TBD
- Total Estimated costs of required course materials: TBD

Supplemental Resources (no purchase required)

- Readings: TBD
- Hardware/Software: TBD

Course Structure

This course includes both on-campus and online sections. To attend synchronously online, log into ELMS-Canvas at the time of the Section 0101 class and select “Video Conference” from the left side menu. This will open a Zoom link to the live classroom.

For asynchronous online students, all lectures will be recorded and made available on ELMS-Canvas under “Panopto Recordings/Video Lectures” within 24 hours of the class time. Be sure to review the recorded lecture in a timely manner.

On-campus students come to class prepared to engage with the lecture and materials. Online students, be sure to log into Canvas regularly and participate in discussions and activities. Regardless of the section you are enrolled in, participation is expected.

Please note that F1 students enrolled in the on-campus section are required to attend in person. If you have a conflict on a particular day, please reach out to me in advance to discuss.

Communication Guidelines

Communicating with the Instructor

My goal is to be readily available to you throughout the semester. I can be reached by email. Please DO NOT email me with questions that are easily found in the syllabus or on ELMS-Canvas (e.g., When is this assignment due? How much is it worth? etc.), but please DO reach out about personal, academic, and intellectual concerns/questions.

When constructing an email to me please put "ENPM818F (Section XXXX): Your Topic" in the subject line. This will draw my attention to your email and enable me to respond to you more quickly.

Additionally, please review These tips for 'How to email a professor'. By following these guidelines, you will be ensured to receive a timely and courteous response.

Finally, if you need to discuss issues not appropriate for the classroom and/or an email, we can arrange to talk by phone, over Zoom, or in person. Send me an email asking for a meeting and we can set something up.

Announcements

I will send IMPORTANT messages, announcements, and updates through ELMS-Canvas. To ensure you receive this information in a timely fashion, make sure your email and announcement notifications (including changes in assignments and/or due dates) are enabled in ELMS-Canvas (How to change notification settings in CANVAS). Log into our ELMs-Canvas course site at least once every 24-hour period to check your inbox and the Announcements page.

Names/Pronouns and Self-Identifications

The University of Maryland recognizes the importance of a diverse student body, and we are committed to fostering inclusive and equitable classroom environments. I invite you, if you wish, to tell us how you want to be referred to in this class, both in terms of your name and your pronouns (he/him, she/her, they/them, etc.). Keep in mind that the pronouns someone uses are not necessarily indicative of their gender identity. Visit trans.umd.edu to learn more.

Additionally, it is your choice whether to disclose how you identify in terms of your gender, race, class, sexuality, religion, and dis/ability, among all aspects of your identity (e.g., should it come up in classroom conversation about our experiences and perspectives) and should be self-identified, not presumed or imposed. I will do my best to address and refer to all students accordingly, and I ask you to do the same for all of your fellow Terps.

Communicating with your Peers

With a diversity of perspectives and experience, we may find ourselves in disagreement and/or debate with one another. As such, it is important that we agree to conduct ourselves in a professional manner and that we work together to foster and preserve a virtual classroom environment in which we can respectfully discuss and deliberate controversial questions. I encourage you to confidently exercise your right to free speech—bearing in mind, of course, that you will be expected to craft and defend arguments that support your position. Keep in mind, that free speech has its limit and this course is NOT the space for hate speech, harassment, and derogatory language. I will make every reasonable attempt to create an atmosphere in which each student feels comfortable voicing their argument without fear of being personally attacked, mocked, demeaned, or devalued.

Any behavior (including harassment, sexual harassment, and racially and/or culturally derogatory language) that threatens this atmosphere will not be tolerated. Please alert me immediately if you feel threatened, dismissed, or silenced at any point during our semester together and/or if your engagement in discussion has been in some way hindered by the learning environment.

Netiquette Policy

Netiquette is the social code of online classes. Students share a responsibility for the course's learning environment. Creating a cohesive online learning community requires learners to support and assist each other. To craft an open and interactive online learning environment, communication has to be conducted in a professional and courteous manner at all times, guided by common sense, collegiality and basic rules of etiquette.

Grading

Grade Breakdown

Assignment	Percentage %
Homework/Projects	**70%**
Participation/Engagement	**10%**
Team Project/Paper/Presentation	**20%**
Total	**100%**

Grading of Assignments

All assignments will be graded according to a predetermined set of criteria (i.e., rubric) which will be communicated to students before the assignment is submitted.

To progress satisfactorily in this class, students need to receive timely feedback. If an assignment is taking longer than expected to grade, students will be informed of when they can expect to see their grade.

Grade Computation

All assessment scores will be posted on ELMS/Canvas page. If you would like to review any of your grades (including the exams), or have questions about how something was scored, please email me to schedule a time for us to meet and discuss.

It is expected that you will submit work by the deadline listed in the syllabus and/or on ELMS-Canvas. Late work will be penalized according to the late work policy described in the **Course Policies and Procedures** section below.

Grade Disputes: I am happy to discuss any of your grades with you, and if I have made a mistake, I will immediately correct it. Any formal grade disputes must be submitted in writing and within one week of receiving the grade.

Final letter grades are assigned based on the percentage of total assessment points earned. To be fair to everyone I have to establish clear standards and apply them consistently, so please understand that being close to a cutoff is not the same as making the cut (89.99 ≠ 90.00). It would be unethical to make exceptions for some and not others.

Final Grade Cutoffs

Letter Grade	Cutoff
A+	97%
A	94%
A-	90%

B+	87%
B	84%
B-	80%
C+	77%
C	74%
C-	70%
D+	67%
D	64%
D-	60%
F	<60%

Course Schedule

Week #	Topic
1	**Introduction to Network Automation**
2	**Define target network architecture and operational and security requirements and configuration**
3	**Setting up network modeling environment**
4	**Configuring the initial aspects of the target network in cli**
5	**CLI Automation (ssh, Netmiko), environment setup, application to the previous network**
6	**CLI Automation (ssh, Netmiko), environment setup, application to the previous network**
7	**Automation (data serialization standards, data modeling, network automation protocols - NETCONF, RESTCONF, gRPC)**
8	**Automation (data serialization standards, data modeling, network automation protocols - NETCONF, RESTCONF, gRPC)**
9	**Automation (data serialization standards, data modeling, network automation protocols - NETCONF, RESTCONF, gRPC)**
10	**Network-scale configuration and management automation (NAPALM and Ansible), playbooks**
11	**Network-scale configuration and management automation (NAPALM and Ansible), playbooks**
12	**SDN and SD-WAN**
13	**Network Operation and Observability**
14	**Network Operation and Observability**

Note: This is a tentative schedule, and subject to change as necessary – monitor ELMS-Canvas for current deadlines. In the unlikely event of a prolonged university closing, or an extended absence from the university, adjustments to the course schedule, deadlines, and assignments will be made based on the duration of the closing and the specific dates missed.