CLIM 751: PREDICTABILITY AND PREDICTION OF WEATHER AND CLIMATE – CONCEPTS AND PHENOMENOLOGY

Fall 2023 - Syllabus

Instructors: J. Shukla (office: 105 Research Hall, email: jshukla@gmu.edu)
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Class Schedule: Monday 10:30 am – 1:10 pm (face-to-face: 121 Research Hall)

Course Homepage:

http://cola.gmu.edu/kinter/CLIM751/
http://mymasonportal.gmu.edu (Blackboard)
All reading materials will be posted on Blackboard.

Textbooks, Recommended and Supplementary Reading Materials:

Required Reading: See list.

Course Description:

This course covers predictability and seamless prediction of weather and climate for timescales ranging from days to decades. Studies limitations to predictability due to chaos, and possible sources of predictability due to slowly varying surface boundary conditions produced by interactions among atmospheres, ocean and land system. Discusses predictability of droughts and floods, monsoons, ENSO, decadal variations and climate change. Classes will be held online using Blackboard and sessions will be recorded for future reference.

Course Requirements:

1. *Presentation of Selected Papers from the Literature*: 70%
2. *Data analysis project:* 30%

Each week, selected students will be assigned to present papers from the scholarly literature. All students are expected to read all the required papers each week. One student will be asked to present the paper, and one student may be asked to summarize the impact of the paper, e.g., with a summary of the papers that have cited it since publication. All students are expected to conduct a data analysis exercise, using data sets provided for the course including long time series of re-forecasts and verifying observations. A separate assignment sheet describes the data analysis project.

Detailed Course Schedule (subject to minor adjustment)

Date	Week	Lecturer	Topic
21 Aug	1	Kinter/Shukla	Logistics; Introduction; Prediction of Weather & Climate
28 Aug	2	Shukla	Weather Predictability
4 Sep	NA	NA	HOLIDAY
11 Sep	3	Shukla	Dynamical Seasonal Prediction
18 Sep	4	Kinter	Data Analysis Project
25 Sep	5	DelSole	Predictability of Decadal Var. & Climate Change
2 Oct	6	Krishnamurthy	Predictability of the South Asian Monsoon
10 Oct (TUE)	7	Dirmeyer	Land Surface Predictability
16 Oct	8	Straus	Intraseasonal Predictability
23 Oct	9	Kinter	Predictability of Extreme Events
30 Oct	10	Kinter	Ensembles and Predictability
6 Nov	11	Huang	Seasonal Prediction: ENSO
13 Nov	12	Buckley	Predictability of North Atlantic SST
20 Nov	13	Burls	The Ocean’s Role in Tropical Climate Prediction
27 Nov	14	Students	Data Project Presentations

PAPERS The papers listed below (subject to revision) are readings for each week of the course. The references below are either *REQUIRED* (should be read by all students), *RECOMMENDED* (optional reading), or *PRESENTED* (to be presented by students; highlighted in yellow). In some weeks, there will be two papers presented by students. In other weeks, there will only be a single paper presented, whose impact will be assessed by a different student. A separate schedule of student presentations will be provided.

1 – INTRODUCTION (no student presentations this week)

- *REQUIRED*: Shukla, J., 1985: Predictability. Issues in atmospheric and oceanic modeling, Part II. Weather Dynamics. *Advances in Geophysics*, Vol. 28B. Ed: S. Manabe, Academic Press, 87-122.
- *REQUIRED*: Huang, B., C.-S. Shin, J. Shukla, L. Marx, M. A. Balmaseda, S. Halder, P. A. Dirmeyer, and J. L. Kinter III, 2017: Reforecasting the ENSO Events in the Past Fifty-Seven Years (1958-2014). *J. Climate*, doi: 10.1175/JCLI-D-16-0642.1
- *REQUIRED*: Shukla, J. and J. L. Kinter III, 2006: Predictability of seasonal climate variations: A pedagogical review. In *Predictability of Weather and Climate*, T. Palmer and R. Hagedorn, eds. (Cambridge University Press, Cambridge, UK, 702 pp.), 306-341.

2 – WEATHER

- *TO BE PRESENTED*: Lorenz, E. N. (1982) Atmospheric predictability experiments with a large numerical model, Tellus, 34:6, 505-513, DOI: 10.3402/tellusa.v34i6.10836
- *TO BE PRESENTED*: Lorenz 1969: Three approaches to atmospheric predictability. *Bull. Amer. Meteor. Soc.,* 50**,** 345-351.
- *REQUIRED*: Lorenz, E. N. 1963: Deterministic Nonperiodic Flow. *J. Atmos. Sci*., 20, 130-141.

3 – DYNAMICAL SEASONAL PREDICTION

- *TO BE PRESENTED (#1)*: Lorenz, E. N., 1975: Climate predictability: The physical basis of climate modeling. *GARP Publication Series*, 16, WMO, 132–136.
- *TO BE PRESENTED (#1)*: Hoskins, B., 2012: Predictability Beyond the Deterministic Limit. *WMO Newsletter*, 61, World. Meteor. Org. (https://public.wmo.int/en/bulletin/predictability-beyond-deterministic-limit)**.**
- *TO BE PRESENTED (#2)*: Hoskins, B., 2013: The potential for skill across the range of the seamless weather-climate prediction problem: a stimulus for our science. *Quart. J. Roy. Meteor. Soc*., 139: 573–584.
- Shukla, J., 2009: Seamless Prediction of Weather and Climate: A New Paradigm for Modeling and Prediction Research. US National Oceanic and Atmospheric Administration Climate Test Bed Joint Seminar Series. NCEP, Camp Spring, MD.
- *REQUIRED*: Shukla, J., 1981: Dynamical predictability of monthly means. *J. Atmos. Sci.*, 38, 2547-2572.
- *REQUIRED*: Shukla, J., 1998: Predictability in the Midst of Chaos: A Scientific Basis for Climate Forecasting. *Science*, 282, 728-731.
- *REQUIRED*: Miyakoda, K. and J. Sirutis, 1985: Extended range forecasting**.** *Adv. Geophys.*, 28B**,** 55-85.

4 – DATA ANALYSIS PROJECT

- *REQUIRED*: Huang, B., C.-S. Shin, J. Shukla, L. Marx, M. A. Balmaseda, S. Halder, P. A. Dirmeyer, and J. L. Kinter III, 2017: Reforecasting the ENSO Events in the Past Fifty-Seven Years (1958-2014). *J. Climate*, doi: 10.1175/JCLI-D-16-0642.1

5 – DECADAL & CLIMATE CHANGE

- *TO BE PRESENTED*: IPCC AR6: chapter 4: Future Global Climate: Scenario-based Projections and Near-term Information (up to and including sec. 4.4).https://www.ipcc.ch/report/ar6/wg1/
- *TO BE PRESENTED*: Scaife and Smith, 2018: A signal-to-noise paradox in climate science. npj https://www.nature.com/articles/s41612-018-0038-4
- *REQUIRED*: DelSole, T., 2017: Decadal Prediction of Temperature: Achievements and Future Prospects. *Curr. Climate Change Rep.*, doi: 10.1007/s40641-017-0066-x.
- *REQUIRED*: Smith, D.M., R. Eade, A. A.Scaife, L.-P. Caron, G. Danabasoglu, T. M. DelSole, T. Delworth, F. J. Doblas-Reyes, N. J. Dunstone, L. Hermanson, V. Kharin, M. Kimoto, W. J. Merryfield, T. Mochizuki, W. A. Müller, H. Pohlmann, S. Yeager, Yang, X., 2019: Robust Skill of Decadal Predictions. *njp Nature Climate and Atmospheric Science*, 2, https://www.nature.com/articles/s41612-019-0071-y.
- *RECOMMENDED*: Latif, M., and N. S. Keenlyside, 2011: A perspective on decadal climate variability and predictability, *Deep Sea Res., Part II*, *58*(17–18), 1880–1894, doi:10.1016/j.dsr2.2010.10.066.
- *RECOMMENDED*: Hawkins, E. and R. Sutton, 2009: The potential to narrow uncertainty in regional climate predictions. *Bull. Amer. Meteor. Soc.*, 90 (8), 1095—1107, doi: 10.1175/2009BAMS2607.1.
- *RECOMMENDED*: Doblas-Reyes and coauthors, 2013, Initialized near-term regional climate change prediction. Nature Communications, 4, 1715. doi: 10.1038/ncomms2704.

6 – SOUTH ASIAN MONSOON

- *TO BE PRESENTED*: Charney, J. G., and J. Shukla, 1981: Predictability of monsoons. *Monsoon Dynamics*, J. Lighthill, and R. P. Pearce, Eds., Cambridge University Press, 99-109.
- *TO BE PRESENTED*: Krishnamurthy, V., 2017: Seasonal prediction of South Asian monsoon in CFSv2, *Climate Dyn*. doi:10.1007/s00382-017-3963-8
- *REQUIRED*: Krishnamurthy, V., 2017: Predictability of CFSv2 in the tropical Indo-Pacific region at daily and subseasonal time scales. *Clim. Dyn*., doi:10.1007/s00382-017-3855-y

7 – LAND SURFACE

- *TO BE PRESENTED*: Dirmeyer, P. A., and S. Halder, and R. Bombardi, 2018: On the harvest of predictability from land states in a global forecast model. *J. Geophys. Res.: Atmos.*, **123**, 13,111-13,127, https://doi.org/10.1029/2018JD029103.
- *TO BE PRESENTED*: Koster, R. D., and Coauthors, 2011: The second phase of the Global Land-Atmosphere Coupling Experiment: Soil moisture contributions to subseasonal forecast skill. *J. Hydrometeor.*, 12, 805-822, https://doi.org/10.1175/2011JHM1365.1.
- *REQUIRED*: Koster, R. D., and Coauthors, 2004: Regions of strong coupling between soil moisture and precipitation. *Science*, 305, 1138-1140, https://doi.org/10.1126/science.1100217.
- *REQUIRED*: Santanello, J. A., and Coauthors, 2018: Land-atmosphere interactions: The LoCo perspective. *Bull. Amer. Meteor. Soc.*, 99, 1253-1272, https://doi.org/10.1175/BAMS-D-17-0001.1.
- *REQUIRED*: Shukla, J. and Y. Mintz, 1982: Influence of Land-Surface Evapotranspiration on the Earth's Climate. *Science,* 215, 1498-1501, DOI:10.1126/science.215.4539.1498

- *RECOMMENDED*: Dirmeyer, P. A., and S. Halder, 2017: Application of the land-atmosphere coupling paradigm to the operational Coupled Forecast System, Version 2 (CFSv2). *J. Hydrometeor.*, 18, 85-108, https://doi.org/10.1175/JHM-D-16-0064.1.

8 – INTRASEASONAL

- *TO BE PRESENTED*: Kim, H. et al., 2018: Prediction of the Madden-Julian Oscillation: A Review. *J. Climate,* 31, 9425-9443.
- *REQUIRED:* Ferranti, L., L. Magnusson, F. Vitart and D. S. Richardson, 2018: How far in advance can we predict changers in large-scale flow leading to severe cold conditions over Europe? *Quart. J. Roy. Meteor. Soc*., 144, 1788-1802. DOI:10.1002/qj.3341.
- *REQUIRED*: Simmons, A. J., J. M. Wallace, and G. W. Branstator, 1983: Barotropic Wave Propagation and Instability, and Atmospheric Teleconnection Patterns. *J. Atmos. Sci.,* **40**, 1363-1392.
- REQUIRED: Vitart, F., 2017: Madden-Julian Oscillation prediction and teleconnections in the S2S database. *Quart. J. Roy. Meteor. Soc*., 143, 2210-2220. July 2017 A DOI:10.1002/qj.3079.
- *RECOMMENDED*: Sardeshmukh, P. D., and B. J. Hoskins, 1988: The Generation of Global Rotational Flow by Steady Idealized Tropical Divergence. *J. Atmos. Sci.,* **45**, 1228-1251.
- *RECOMMENDED:* Judt, F., 2020: Atmospheric Predictability of the Tropics, Middle Latitudes, and Polar Regions Explored through Global Storm-Resolving Simulations. *J. Atmos. Sci*., 77, 257-276.
- *RECOMMENDED:* Vitart, F., and F. Molteni, 2010: Simulation of the Madden-Julian Oscillation and its teleconnections in the ECMWF forecast system. *Quart. J. Roy. Meteor. Soc.,* 649B, 842–855.
- *RECOMMENDED:* Ferranti, L., S. Corti and M. Janousek, 2014: Flow-dependent verification of the ECMWF ensemble over the Euro-Atlantic sector. *Quart. J. Roy. Meteor. Soc.*, 688A, 916–924.

9 – EXTREME EVENTS

- *TO BE PRESENTED*: Weisheimer, A., F. J. Doblas-Reyes, T. Jung, *and* T. N. Palmer, 2011: On the predictability of the extreme summer 2003 over Europe, *Geophys. Res. Lett.,* 38, L05704, *doi:*10.1029/2010GL046455.
- *REQUIRED:* Feudale, L. and J. Shukla, 2011a: Influence of sea surface temperature on the European heat wave of 2003 summer. Part I: an observational study. *Climate Dyn*., 36:1691–1703, DOI 10.1007/s00382-010-0788-0
- *REQUIRED:* Feudale, L. and J. Shukla, 2011b: Influence of sea surface temperature on the European heat wave of 2003 summer. Part II: a modeling study. *Climate Dyn*., 36:1705-1715, DOI 10.1007/s00382-010-0789-z
- *REQUIRED*: Gershunov, A., 1998: ENSO influence on intraseasonal extreme rainfall and temperature frequencies in the contiguous United States: Implications for long-range predictability. *J. Climate*, 11, 3192–3203.
- *REQUIRED:* Craig, G. C., Fink, A. H., Hoose, C., Janjić, T., Knippertz, P., Laurian, A., Lerch, S., Mayer, B., Miltenberger, A., Redl, R., Riemer, M., Tempest, K. I., & Wirth, V. (2021). Waves to Weather: Exploring the Limits of Predictability of Weather, *Bulletin of the American Meteorological Society*, *102*(11), E2151-E2164. https://journals.ametsoc.org/view/journals/bams/102/11/BAMS-D-20-0035.1.xml
- *REQUIRED*: Sillmann, J., Thorarinsdottir, T., Keenlyside, N., Schaller, N., Alexander, L.V., Hegerl, G., Seneviratne, S.I., Vautard, R., Zhang, X., Zwiers, F.W., 2017: Understanding, modeling and predicting weather and climate extremes: challenges and opportunities. *Weather Clim. Extremes,* 18, 65–74.

- *REQUIRED*: Vitart, F., Robertson, A.W., 2018: The sub-seasonal to seasonal prediction project and the prediction of extreme events. *npj Clim Atmos Sci* **1,** 3. https://doi.org/10.1038/s41612-018-0013-0
- *REQUIRED*: Pepler, A. S., L. B. Diaz, C. Prodhomme, F. J. Doblas-Reyes, A. Kumar, 2015: The ability of a multi-model seasonal forecasting ensemble to forecast the frequency of warm, cold and wet extremes. *Wea. Climate Extremes*, 9, 68-77.
- *REQUIRED*: Namias, J., 1978: Multiple causes of the North American abnormal winter of 1976-77. *Mon. Wea. Rev*., 106 (1978), pp. 279–295.
- *RECOMMENDED*: Della-Marta, P. M., J. Luterbacher, H. von Weissehfluh, E. Xoplaki, M. Brunet, H. Wanner, 2007: Summer heat waves over western Europe 1880-2003, their relationship to large-scale forcings and predictability. *Climate Dyn*., 29, 251-275.
- *RECOMMENDED*: Miyakoda, K., T. Gordon, R. Caverly, W. Stern, and J. Sirutis, 1983: Simulation of a blocking event in January 1977. *Mon. Wea. Rev*., 111, 846-869.

10 – ENSEMBLES

- *TO BE PRESENTED*: Becker, E. F., H. van den Dool, and Q. Zhang, 2014: Predictability and Forecast Skill in NMME. *J. Climate*, 27, 5891-5906.
- *TO BE PRESENTED:* Slingo, J. and T. N. Palmer, 2016: Uncertainty in weather and climate prediction. *Phil. Trans. R. Soc. A* (2011) 369, 4751–4767.
- *REQUIRED:* Leutbecher, M. 2019: Ensemble size: How suboptimal is less than infinity? *Quart. J. Roy. Meteor. Soc*., 145, 107– 128. https://doi.org/10.1002/qj.3387
- *REQUIRED:* Pegion, K., and Coauthors, 2019: The Subseasonal Experiment (SubX): A Multimodel Subseasonal Prediction Experiment. *Bull. Amer. Meteor. Soc.*, **100**, 2043–2060.
- *REQUIRED*: Hagedorn, R., F. J. Doblas-Reyes and T. N. Palmer, 2005: The rationale behind the success of multi-model ensembles in seasonal forecasting – I. Basic concept. *Tellus*, 57A*, 219–233.*
- *RECOMMENDED*: Kirtman, B. P., D. Min, J. M. Infanti, J. L. Kinter III, D. A. Paolino, Q. Zhang, H. van den Dool, S. Saha, M. Pena Mendez, E. Becker, P. Peng, P. Tripp, J. Huang, D. G. DeWitt, M. Tippett, A. G. Barnston, S. Li, A. Rosati, S. D. Schubert, M. Rienecker, M. Suarez, Z. E. Li, L. Marshak, Y.-K. Lim, J. Tribbia, K. Pegion, W. J. Merryfield, B. Denis, E. F. Wood, 2014: The North American Multimodel Ensemble: Phase-1 Seasonal-to-Interannual Prediction; Phase-2 toward Developing Intraseasonal Prediction. *Bull. Amer. Meteor. Soc*., 95, 585-601.

11 – SEASONAL PREDICTION: ENSO

- *TO BE PRESENTED*: Timmermann, A., An, S., Kug, J. et al. 2018: El Niño–Southern Oscillation complexity. *Nature* 559, 535–545. https://doi.org/10.1038/s41586-018-0252-6
- *TO BE PRESENTED*: L'Heureux, M.L, A.F.Z. Levine, M. Newman, C. Ganter, J.-J. Luo, M. K. Tippett, and T. N. Stockdale, 2020: ENSO Prediction. In El Niño Southern Oscillation in a Changing Climate (an AGU book to be published in August). (only a manuscript is available now)
- *REQUIRED:* Zhu, J., B. Huang, L. Marx, J. L. Kinter III, M. A. Balmaseda, R.-H. Zhang, and Z.-Z. Hu, 2012: Ensemble ENSO hindcasts initialized from multiple ocean analyses. *Geophy. Res. Lett.,* 39, L09602, DOI:10.1029/2012GL051503.
- *REQUIRED:* McPhaden, M. J., A. Timmermann, M. J. Widlansky, M. A. Balmaseda, and T. N. Stockdale, 2015: The curious case of the El Niño that never happened. *Bull. Amer. Meteor. Soc*., 96, 1647-1665.

12 – OCEAN DYNAMICS AND NORTH ATLANTIC SST

(Note: The first student presentation - #1 - includes one paper, a comment on that paper and a reply to the comment. The second student presentation is a single paper - #2.)

- *TO BE PRESENTED (#1)*: Clement, Amy, K. Bellomo, L.N. Murphy, M. Cane, T. Mauritsen, G. Rädel and B. Stevens (2015). The Atlantic Multidecadal Oscillation without a role for ocean circulation, *Science*, 350, 320—324.
- *TO BE PRESENTED (#1)*: Zhang, Rong, R. Sutton, G. Danabasoglu, T.L. Delworth, W.M. Kim, J. Robson, and S.G. Yeager (2016), Comment on ``The Atlantic Multidecadal Oscillation without a role for ocean circulation", *Science*, 352, 1527—1527.
- *TO BE PRESENTED (#1)*: Clement, Amy, K. Bellomo, L.N. Murphy, M. Cane, T. Mauritsen, G. Rädel and B. Stevens (2016), Response to Comment on ``The Atlantic Multidecadal Oscillation without a role for ocean circulation", *Science*, 352, 1527—1527.
- *TO BE PRESENTED (#2)*: O'Reilly, C.H., M. Huber, T. Woollings, and L. Zanna (2016), The signature of low-frequency oceanic forcing in the Atlantic Multidecadal Oscillation, *Geophys. Res. Lett.*, 43, doi: 10.1002/2016GL067925.
- *REQUIRED*: Zhang, R. (2017), On the persistence and coherence of subpolar sea surface temperature and salinity anomalies associated with the Atlantic multidecadal variability, *Geophys. Res. Lett*., 44, doi:10.1002/2017GL074342.
- *REQUIRED*: Buckley, M.W. and J. Marshall (2016). Observations, inferences and mechanisms of the Atlantic Meridional Overturning Circulation: a review. *Reviews of Geophysics*, 54, 5—63. doi: 10.1002/2015RG000493. ONLY required to read sections 2.4 and 6. The rest of the paper, particularly the introduction and section 2 may be useful background for students, particularly those not familiar with the oceanography of the Atlantic Ocean.
- *RECOMMENDED:* Buckley, M. W., T. DelSole, M. S. Lozier, and L. Li (2019), Predictability of North Atlantic Sea Surface Temperature and Upper Ocean Heat Content, *J. Climate*, 32, 3005-3023, doi: 10.1175/JCLI-D-18-0509.1.
- *RECOMMENDED*: Gulev, S. K., M. Latif, N. Keenlyside, W. Park, and K. P. Koltermann (2013), North Atlantic Ocean control on surface heat flux on multidecadal timescales, *Nature*, 499, 464–467, doi:10.1038/ nature12268.
- *RECOMMENDED*: Cane, Mark A., A.C. Clement, L.M. Murphy, and K. Bellomo (2017), Low-Pass Filtering, Heat Flux, and Atlantic Multidecadal Variability, *J. Climate*, 30, 7529—7553, doi: 10.1175/JCLI-D-16-0810.1.

13 – OCEAN'S ROLE

- *TO BE PRESENTED*: Chang, P., T. Yamagata, P. Schopf, S. K. Behera, J. Carton, W. S. Kessler, G. Meyers, T. Qu, F. Schott, S. Sheyte, and S.-P. Xie, 2006: Climate Fluctuations of Tropical Coupled Systems – The Role of Ocean Dynamics. *J. Climate*, 19, 5122-5174.

Goals and Learning Outcomes:

The course will:

1. *Provide a background in the scientific problem of weather and climate predictability.* Students will gain an in-depth understanding of how and why weather and climate may be predictable. Students will have the opportunity to critically review the scholarly literature on the predictability of variations of the Earth system at time scales of days to decades. The emphasis on both the nature of scientific findings and the impact that individual papers have had on subsequent scholarship ensure that students will gain an appreciation for the practice of professional scientific inquiry.

2. *Provide knowledge and skills necessary to conduct original quantitative research in predictability.* By have access to a current research-quality data set for analysis and manipulation, the students will develop the ability to work with high-volume geophysical data from a variety of sources.

3. *Reinforce oral and written communication skills.* Students will present papers from the literature, evaluate the impact these papers have had on the scientific body of knowledge, and critically examine the results reported in the literature. Students will write reports on the findings of their calculations with research-quality data sets, with the potential to submit truly new findings for peer-reviewed publication.

GMU Email Accounts:

Students must use their Mason email accounts to receive important University information, including messages related to this class. See http://masonlive.gmu.edu for more information.

Academic Integrity:

Mason is an Honor Code university; please see the Office for Academic Integrity (https://oai.gmu.edu/) for a full description of the code and the honor committee process. The principle of academic integrity is taken very seriously and violations are treated gravely. What does academic integrity mean in this course? Essentially this: when you are responsible for a task, you will perform that task. When you rely on someone else's work in an aspect of the performance of that task, you will give full credit in the proper, accepted form. Another aspect of academic integrity is the free play of ideas. Vigorous discussion and debate are encouraged in this course, with the firm expectation that all aspects of the class will be conducted with civility and respect for differing ideas, perspectives, and traditions. When in doubt (of any kind) please ask for guidance and clarification.

Please note: The homework for this course should be **your own work**, not done in collaboration with other students. If you have questions about the homework, please send email (ikinter@gmu.edu).

Diversity and Inclusion:

This course will be conducted in a manner that is consistent with the George Mason University policies on non-discrimination (https://universitypolicy.gmu.edu/policies/non-discrimination-policy/), and diversity (https://stearnscenter.gmu.edu/knowledge-center/general-teaching-resources/mason-diversity-statement/) and the policy prohibiting sexual and gender-based harassment and inter-personal violence (https://universitypolicy.gmu.edu/policies/sexual-harassment-policy/). The instructors in this course are committed to being mindful of diversity, one of Mason's core values. The University promotes a living and learning environment for outstanding growth and productivity among its students, faculty and staff. Through its curriculum, programs, policies, procedures, services and resources, Mason strives to maintain a quality environment for work, study and personal growth.

An emphasis upon diversity and inclusion throughout the campus community is essential to achieve these goals. Diversity is broadly defined to include such characteristics as, but not limited to, race, ethnicity, gender, religion, age, disability, and sexual orientation. Diversity also entails different viewpoints, philosophies, and perspectives. Attention to these aspects of diversity will help promote a culture of inclusion and belonging, and an environment where diverse opinions, backgrounds and practices have the opportunity to be voiced, heard and respected.

The reflection of Mason's commitment to diversity and inclusion goes beyond policies and procedures to focus on behavior at the individual, group and organizational level. The implementation of this commitment to diversity and inclusion is found in all settings, including individual work units and groups, student organizations and groups, and classroom settings; it is also found with the delivery of services and activities, including, but not limited to, curriculum, teaching, events, advising, research, service, and community outreach.

Acknowledging that the attainment of diversity and inclusion are dynamic and continuous processes, and that the larger societal setting has an evolving socio-cultural understanding of diversity and inclusion, Mason seeks to continuously improve its environment. To this end, the University promotes continuous monitoring and self-assessment regarding diversity. The aim is to incorporate diversity and inclusion within the philosophies and actions of the individual, group and organization, and to make improvements as needed.

As faculty members and designated "Responsible Employees," the instructors for this course are required to report all disclosures of sexual assault, interpersonal violence, and stalking to Mason's *Title IX Coordinator* per *university policy 1412*. If you wish to speak with someone confidentially, please contact the *Student Support and Advocacy Center* (703-380-1434) or *Counseling and Psychological Services* (703-993-2380). You may also seek assistance from *Mason's Title IX Coordinator* (703-993-8730; titleix@gmu.edu).

Gender identity and pronoun use: If you wish, please share your name and gender pronouns with me (ikinter@gmu.edu) and how best to address you in class and via email.

Disability Accommodations:

Disability Services at George Mason University is committed to providing equitable access to learning opportunities for all students by upholding the laws that ensure equal treatment of people with disabilities. If you are seeking accommodations for this class, please first visit http://ds.gmu.edu/ for detailed information about the Disability Services registration process. Then please discuss your approved accommodations with me. Disability Services is located in Student Union Building I (SUB I), Suite 2500. Email:ods@gmu.edu | Phone: (703) 993-2474

Other Useful Campus Resources:

Mason has several support services for students. Please go to https://stearnscenter.gmu.edu/knowledge-center/knowing-mason-students/student-support-resources-on-campus/ for a directory of services.

University Policies:

The University Catalog, http://catalog.gmu.edu, is the central resource for university policies affecting student, faculty, and staff conduct in university academic affairs. Other policies are available at http://universitypolicy.gmu.edu/. All members of the university community are responsible for knowing and following established policies.