EXPANDED COURSE DESCRIPTION
EARTH, SPACE SCIENCE AND ENGINEERING
Lassonde School of Engineering
Earth and Space Science and Engineering
LE / ESSE 4140 3.0 SECTION M
NUMERICAL WEATHER PREDICTION
FALL 2018 / WINTER 2019

Last Modified Date: 08/29/2018

COURSE CALENDAR DESCRIPTION

The development of computational techniques for the solution of problems in atmospheric dynamics. The construction of numerical models for the prediction of weather. Prerequisites: LE/ESSE 3040 3.00; LE/ECS 1540 3.00 or equivalent FORTRAN programming experience. Prerequisite or corequisite: LE/ESSE 4130 3.00 strongly recommended. PRIOR TO FALL 2014: Prerequisites: LE/EATS 3040 3.00; LE/CSE 1540 3.00 or equivalent FORTRAN programming experience. Prerequisite or corequisite: LE/EATS 4130 3.00 strongly recommended. PRIOR TO SUMMER 2013: Prerequisite or corequisite: SC/EATS 4130 3.00 strongly recommended.

INSTRUCTOR(S)

<table>
<thead>
<tr>
<th>Name</th>
<th>Section / Format / Term</th>
<th>Contact Email</th>
<th>Contact Phone</th>
</tr>
</thead>
<tbody>
<tr>
<td>Klaassen, Gary P</td>
<td>Sec. M / LECT / W</td>
<td><a href="mailto:gklaass@yorku.ca">gklaass@yorku.ca</a></td>
<td>York Ext. 77727</td>
</tr>
</tbody>
</table>

ADDITIONAL INFORMATION

TOPICS AND CONCEPTS
• Finite differencing techniques and error analysis
• Analysis of finite difference approximations to advection and diffusion equations
• Development of criteria for computational stability and convergence.
• Aliasing and non-linear computational instability
• Galerkin spectral and finite element techniques
• Shallow water equations
• Geostrophic adjustment and model initialization
• Parameterization of physical processes
• Numerical Forecast Models

MAIN REFERENCE

RECOMMENDED TEXTS
Atmospheric Modelling, Data Assimilation and Predictability, E. Kalnay (Cambridge University Press, 2003)

FURTHER REFERENCES
• Numerical Methods for Fluid Dynamics: With Applications to Geophysics, Durran (Springer 2010).
• Warner, T. Numerical Weather and Climate Prediction. 2011
• Washington, W.M. and Parkinson, C.L. An introduction to three-dimensional climate modeling. 1986
• Daley, Atmospheric Data Analysis 1991
• Mesinger, F. and Arakawa, A. Numerical methods used in atmospheric models 1976
• Pielke, R.A. Mesoscale meteorological modeling. 1st Edn 1984, 2nd Edn 2002

GRADED ASSESSMENT
Labs/Assignments: 50% [ eight 3-hour labs ]
Exam (3 hrs): 50%

ACADEMIC INTEGRITY LINKS
• Senate Policy on Academic Honesty - http://secretariat-policies.info.yorku.ca/policies/academic-honesty-senate-policy-on/
• Academic Integrity - http://lassonde.yorku.ca/academic-integrity

STUDENT LINKS
• Student Rights and Responsibilities - http://oscr.students.uit.yorku.ca/student-conduct
• Religious Observance - https://w2prod.sis.yorku.ca/Apps/WebObjects/cdm.woa/wa/regobs
• Academic Accommodation for Students with Disabilities - http://secretariat-policies.info.yorku.ca/policies/academic-accommodation-for-students-with-disabilities-policy/
• Counselling and Disability Services - http://cds.info.yorku.ca/
• York University’s Policies on Sexual Violence - http://secretariat-policies.info.yorku.ca/policies/sexual-violence-policy-on/
• York University’s Policies on Gender/LGBTQ*/Positive Space - http://rights.info.yorku.ca/lgbtq/

LAND ACKNOWLEDGEMENT
• We acknowledge our presence on the traditional territory of many Indigenous Nations. The area known as Tkaronto has been care taken by the Anishinabek Nation, the Haudenosaunee Confederacy, the Huron-Wendat, and the Métis. It is now home to many Indigenous Peoples. We acknowledge the current treaty holders, the Mississaugas of the New Credit First Nation. This territory is subject of the Dish With One Spoon Wampum Belt Covenant, an agreement to peaceably share and care for the Great Lakes region.
• The Indigenous Framework for York University: A Guide to Action can be found here: http://indigenous.info.yorku.ca/
• Meaning of a land acknowledgement: http://healthydebate.ca/opinions/indigenous-land-acknowledgements

Many courses utilize Moodle, York University’s course website system. If your course is using Moodle, click here to access it.
Moodle @ York University