**Lecturer:** Jim Martin, Physics Building, UW, Room 357  
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**Teaching Assistant:** Wei, Qianshi, e-mail: q9wei@uwaterloo.ca

**Textbook:** “Modern Electrodynamics”, A. Zangwill  

I will assume that you also have access to (on reserve at libraries):
1. Griffiths, “Introduction to Electrodynamics” (3rd or 4th ed.), the standard undergraduate text, and

**Course Content:**

The course calendar description:

*Solutions to Maxwell’s equations; radiation theory, normal modes; multipole expansion; Kirchhoff’s diffraction theory; radiating point charge; optical theorem. Special relativity; transformation laws for the electromagnetic field; line broadening. Dispersion; Kramers-Kronig relations. Magnetohydrodynamics and plasmas.*

approximately map to the following chapters of Zangwill:

1. Chapter 2, The Maxwell equations  
2. Chapter 15, General electromagnetic fields  
3. Chapter 18, Waves in dispersive matter  
4. Chapter 20, Retardation and Radiation  
5. Chapter 21, Scattering and Diffraction  
6. Chapter 22, Special Relativity  
7. Chapter 23, Fields from moving charges

We will cover as much as possible from these chapters, given time constraints.

**Prerequisites:** We will spend little time reviewing standard undergraduate material. You must have gone through either the first 7 chapters of Griffiths “Introduction to Electrodynamics” (3rd or 4th edition) or equivalent material. I will assume standard undergraduate knowledge of mathematical methods, special relativity, quantum and classical mechanics. You should be able to write simple computer programs in the language of your choice. If you are not prepared, consider taking the course in a future year — I’m happy to provide guidance.

**Course web-site:** [http://learn.uwaterloo.ca/](http://learn.uwaterloo.ca/)

Both Waterloo and Guelph students should have access. Course communication will be by e-mail through your Learn account. Make sure you check this — or forward to an account you do check.

**Course grading:** This course will have \( n \approx 6 \) assignments. Your final grade will be the highest of:

\[
\left(0.5 \times \frac{i}{n}\right) \times \text{average of highest } i \text{ assignments} + \left(1.0 - 0.5 \times \frac{i}{n}\right) \times \text{final exam grade},
\]

where \( i = 0, 1, ..., n - 1, n \).

The final exam will be on Saturday, April 9th, 2:30-5:30pm in the Main link rooms at both Guelph and Waterloo.

UW students should be aware of Policy 71, *Student Discipline:*
[https://uwaterloo.ca/secretariat-general-counsel/policies-procedures-guidelines/policy-71](https://uwaterloo.ca/secretariat-general-counsel/policies-procedures-guidelines/policy-71)  
and Policy 72, *Student Appeals:*
[https://uwaterloo.ca/secretariat-general-counsel/policies-procedures-guidelines/policy-72](https://uwaterloo.ca/secretariat-general-counsel/policies-procedures-guidelines/policy-72)

Guelph students should be aware of similar relevant policies.

Discussion between students regarding assignments is encouraged. However, **under no circumstances** share your written solutions, or make use of previous year’s solutions or solution manuals.