MGS 710, Spring 2024
Subduction Zone Geodynamics
N373, North Grosvenor, RSMAES

Timetable:

Week 1	16th & 19th Jan	**Subduction overview:** *1)* Class Introduction *2)* Lecture (geophysical observations) *Review papers: King (2001); Stern (2002); Billen (2008); Becker and Faccenna (2009); Gerya (2011; 2022).*
Week 2	23rd & 26th Jan	**Subduction kinematics and slab dip:** *1)* Lecture *2)* Tao leads discussion on Hu and Gurnis (2020) *Additional Reading: Jarrard (1986); Hager and O'Connell (1978); Heuret and Lallemend (2005); Heuret et al. (2007); Lallemand et al. (2005); Faccenna et al. (2007); Heuret et al. (2011); Goes et al. (2017); Holt and Royden (2020).*
Week 3	30th Jan & 2nd Feb	**Asthenosphere and slab rheology:** *1)* Lecture *2)* Valeria leads discussion on Bessat et al. (2020) *Additional Reading: Billen and Hirth (2005, 2007); Hager (1984); Čížková et al. (2002); Hirth & Kohlstedt (2003); Jadamec and Billen (2010; 2012); Tetzlaff & Schmeling (2009); Androvičová et al. (2013); Garel et al. (2014); Agrusta et al. (2014; 2017); Bello et al. (2015); Holt and Becker (2017); Goes et al. (2017); Carluccio et al., (2019).*
Week 4	6th & 9th Feb	**Slab bending:** *1)* Lecture *2)* Zonglin leads discussion on Schellart (2009) *and* ensuing back-and-forth comments. *Additional Reading: Becker et al. (1999); Conrad and Hager (1999); Bellahsen et al. (2005); Buffett (2006); Buffett and Rowley (2006); Wu et al. (2008); Capitanio et al. (2009); Ribe (2010); Rose and Korenaga (2011); Buffett and Becker (2012); Fourel et al. (2014); Farrington et al. (2014); Petersen et al., (2017); Gerardi et al. (2019); Sandiford et al. (2020).*
Week 5	13th & 15th Feb	**Subduction-induced mantle flow** *1)* Lecture *2)* Reid leads discussion on Tovish et al. (1978) *and* Piromallo et al. (2006) *Additional Reading: McKenzie (1969); Stevenson and Turner (1977); Garfunkel et al. (1986); Dvorkin et al. (1993); Funiciello et al. (2003b; 2004; 2006); Kincaid and Griffiths (2003); Faccenna et al. (2013; 2017); Kiraly et al. (2017); Holt et al. (2017).*
Week 6	20th & 23rd Feb	**Force balance approach for subduction dynamics** *1)* Adam leads discussion on Royden and Husson (2006). *2)* Class project discussion and planning

		Additional Reading: Billen (2008); Royden and Husson (2009); Crowley and O'Connell (2011); Royden and Holt (2020)
Week 7	27th Feb & 1st March	**Trench motions and 3-D subduction modeling** *1)* Class project session *2)* *Someone* leads discussion on Stegman et al. (2006) *and* Schellart et al. (2007). *Additional Reading: Kincaid and Olson (1987); Christensen (1996); Funiciello et al. (2003a; 2003b); Enns et al. (2005); Bellahsen et al. (2005); Faccenna et al. (2007; 2009; 2018); Nagel et al. (2008); Di Giuseppe et al., (2008); Schellart (2008); Stegman et al. (2010); Ribe (2010); Cizkova and Bina (2013; 2015); Holt et al. (2015a); Yang et al. (2017).*
Week 8	5th & 8th March	**Planetary subduction (Venus):** *1)* Class project session *2)* Reid leads discussion on Davaille et al. (2017). *Additional Reading: Sandwell & Schubert (1992); Fowler & O'Brien (1996); Solomatov & Moresi (1996); Smrekar & Stofan (1997); Moresi & Solomatov (1998); Reese et al. (1999); Ueda et al. (2008); Gulcher et al. (2020; 2023); Adams et al. (2022); Chen et al. (2022); Rolf et al. (2022); Smrekar et al. (2022); Maia et al. (2023).*
Week 9	*11th – 15th March*	*SPRING RECESS*
Week 10	19th & 22nd March	**Subduction interface and slab-overriding plate interactions** *1)* Lecture *2)* *Someone* leads discussion on Beall et al. (2021). *Additional Reading: Capitanio et al. (2010; 2011); Holt et al. (2015b); Sharples et al. (2014); Yamato et al. (2009); Butterworth et al. (2012); Clark et al. (2008); Wallace et al. (2009); Schellart & Moresi (2013); van Dinther et al. (2013a, 2013b); Behr and Becker (2018); Cerpa et al. (2018); Guillaume et al. (2018); Brizzi et al. (2020; 2021); Sandiford et al. (2021); Behr et al. (2022).*
Week 11	26th & 29th March	**Rock exhumation at subduction zones:** *1)* Lecture *2)* Valeria leads discussion on Vaughan-Hammon et al. (2022) *Additional Reading: Chemanda et al. (1995; 1996; 2001); Burov et al. (2001); Gerya et al. (2002); Boutelier et al. (2004); Stockhert & Gerya (2005); Brun and Faccenna (2008); Warren et al. (2008a; 2008b); Yamato et al. (2008); Husson et al. (2009); Beaumont et al. (2009); Bialas et al. (2011); Ruh et al. (2015); McCarthy et al. (2020); Kerswell et al. (2023).* *Some Geology Reviews: Guillot et al. (2009); Warren (2013); Platt (1993); Brown and Johnson (2019); Agard et al. (2018; 2023);*
Week 12	2nd & 5th April	**Subduction-induced topography** *1)* Lecture (Goldberg) *2)* Tao leads discussion on Crameri et al. (2017).

		Additional Reading: Melosh and Raefsky (1980); Mitrovica et al. (1989; 1996); Zhong and Gurnis (1992; 1994); Gurnis (1993); Buiter et al. (2001); Gurnis et al. (1996); Husson (2006); Husson et al. (2012); Heine et al. (2008); DiCaprio et al. (2009); Eakin et al. (2014); Gerault et al. (2015); Flament et al. (2015); Rubey et al. (2017); Sarr et al. (2019); Briaud et al. (2020); Faccenna and Becker (2020) , Balazs et al. (2022); Holt (2022); Xue et al. (2022); Deng et al. (2024). *Reviews: Braun (2010); Flament et al. (2013); Hoggard et al. (2021); Davies et al. (2022)*
Week 13	9th & 12th April	**Global subduction dynamics** *1)* Lecture *2)* Class project session *Additional Reading: Alisic et al. (2010; 2012); Stadler et al. (2010); Morra et al. (2009; 2010; 2012); Husson (2012); Quevedo et al. (2013); Ficini et al. (2017); Chertova et al. (2018); Holt and Royden (2020), Chamolly and Ribe (2021); Hu et al. (2022); Holt (2022); Chen et al. (2022a, 2022b); Goldberg and Holt (2024).*
Week 14	16th & 19th April	**Subduction initiation** *1)* Lecture (Shuck) *2)* Zonglin leads discussion on Lallemand & Arcay (2021). *Additional Reading: Toth & Gurnis (1998); Faccenna et al. (1999); Hall et al. (2003); Stern (2004); Stern & Gerya (2017); Gurnis et al. (2004; 2019); Leng & Gurnis (2011; 2015); Baes et al. (2016); Crameri & Tackley (2016); Crameri et al. (2020); Maunder et al. (2020); Lallemend & Arcay (2021); Zhou & Wada (2021; 2022); Shuck et al. (2022); Li & Gurnis (2023).*
Week 15	23rd & 26th April	**Wrap-up & Class presentations**

Additional topics: We cannot of course cover the entirety of subduction zone geodynamics within one semester and so I have tried to strike a balance between: i) fundamental subduction geodynamics topics; ii) topics relevant to work within the research group. Notable absences include subduction zone thermal structure, volcanism, slab-deep mantle interactions, flexural/isostatic topography, seismicity (e.g., shallow vs. intermediate depth vs. deep slab earthquakes), megathrust earthquakes and slip, and many, many other types of observations (e.g., the modeling of shear wave anisotropy/splitting).

[Full bibliography coming soon]