

ASYR 2710
BABYLONIAN ASTRONOMY

INSTRUCTOR

John Steele, Department of Egyptology and Assyriology

MEETING TIME

TBC

LOCATION

WILBOUR HALL 203

INSTRUCTOR OFFICE HOURS

THURSDAY 2:00 – 3:00PM

COURSE OVERVIEW

This seminar will the development and practice of astronomy and the related astral sciences in Babylonia

CURRICULAR CONTEXT

This seminar is aimed at graduate students in the field of Assyriology or the History of the Exact Sciences in Antiquity. A basic knowledge of the Akkadian cuneiform is recommended but not essential. Likewise, some reading knowledge of French and German is recommended.

COURSE AIMS

The course has three main aims:

- To introduce students to the history of Babylonian astronomy, from both technical and cultural perspectives.
- To expose graduate students to current scholarly debates in the history of ancient science and scholarship.
- To encourage students to relate these debates to problems within their own research.
- To develop students' research and writing skills and their familiarity with the scholarly practices of Assyriology and the history of science.

COURSE OBJECTIVES

By the end of the course students should be able to

- Demonstrate the ability to critically read and discuss key scholarship on Babylonian Astronomy.
- Undertake original research on Babylonian astronomy and its place within ancient astronomy and Babylonian scholarship.
- Write a research paper using the appropriate style of a journal in our field.

COURSE STRUCTURE

Each class will be devoted to discussion of a particular topic (see weekly schedule below). The first half of the class will be a lecture/discussion led by the instructor. The second half of the class will be a discussion on the readings led by a student. The student should briefly (no more than 10 minutes) highlight the most significant points in the readings, and prepare at least 4 discussion questions.

ASSESSMENT

Presentation of readings and discussion leadership: 20%

General participation: 10%

Bi-weekly problems (calculating using Babylonian methods, etc): 20%

Paper 1 (due by the meeting of week 10): 20%

Paper 2 (due by the last day of reading period): 30%

- The presentation of readings and discussion leadership will be assessed on the quality of the summary of the weekly reading (both depth of analysis of the reading and clarity of presentation will be considered), the selection of appropriate additional readings, and the quality of posted discussion questions.

- General participation will be assessed on a student's involvement in class discussions and evidence of having read the assigned readings.
- Paper 1 will be on a topic set by the instructor in the fifth week of class. The paper should be 3000–4000 words in length and follow the style guidelines (reference styles, transcription conventions etc) of a major Assyriology or History of Science journal.
- Paper 2 will be a research paper on a topic related to the course that must be proposed by the student and approved by the instructor by week 9. The paper should be 5000–8000 words in length, follow the style guidelines (reference styles, transcription conventions etc) of a major Assyriology or History of Science journal, and contain original research and analysis.

ACCESSIBILITY AND ACCOMMODATIONS STATEMENT

Brown University is committed to full inclusion of all students. Please inform me early in the term if you have a disability or other conditions that might require accommodations or modification of any of these course procedures. You may speak with me after class or during office hours. For more information, please contact **Student and Employee Accessibility Services** at 401-863-9588 or SEAS@brown.edu. Students in need of short-term academic advice or support can contact one of the deans in the Dean of the College office.

COURSE HOURS AND EXPECTATIONS

Class meetings	39 hours
Weekly class preparation (13 x 10 hours)	130 hours
Problem sets (6 x 3 hours)	18 hours
Essay 1 (research and writing)	20 hours
Essay 2 (research and writing)	30 hours

It is expected that students will attend all of the classes and seminar discussions and arrive on time. All seminar discussions are to be conducted in a supportive, courteous, and inclusive manner - the aim is to learn from one-another not to score points against each-other.

CLASS SCHEDULE AND PRELIMINARY LIST OF READINGS

All readings will be available as pdfs.

1. INTRODUCTION, NUMBERS, BASIC NAKED-EYE ASTRONOMY, THE CALENDAR, SOURCES

- F. Rochberg, "The Cultures of Ancient Sciences: Some Historical Reflections", *Isis* 83 (1992), 547–553.
 F. Rochberg, "A Consideration of Babylonian Astronomy within the Historiography of Science", *Studies in History and Philosophy of Science* 33 (2002), 661–684.
 D. Pingree, "Hellenophilia versus the History of Science", *Isis* 83 (1992), 554–563.
 D. Brown, *Mesopotamian Planetary Astronomy-Astrology* (Groningen: Styx, 2000), 8–10.

2. EARLY ASTRONOMICAL TEXTS: 'THREE STARS EACH', EAE 14, MUL.APIN TABLET 1

- W. Horowitz, "The Astrolabes: Astronomy, Theology, Chronology", in J. M. Steele (ed.), *Calendars and Years: Astronomy and Time in the Ancient Near East* (Oxford: Oxbow Books, 2007), 101–114.
 al-Rawi, F. and George, A., "Enūma Anu Enlil 14 and Other Early Astronomical Tables", *Archiv für Orientforschung* 38 (1991), 52–73.
 H. Hunger and D. Pingree, *Astral Sciences in Mesopotamia* (Leiden: Brill, 1999), 32–73.
 de Jong, T., 2007, "Astronomical Dating of the Rising Star List in MUL.APIN", *Wiener Zeitschrift für die Kunde des Morgenlandes* 97, 107–120.
 Steele, J. M., "The Use and Abuse of Astronomy in Establishing Absolute Chronologies", *Physics in Canada*, 59 (2003), 243–248

3. MUL.APIN TABLET 2 AND RELATED MATERIAL

- H. Hunger and D. Pingree, *Astral Sciences in Mesopotamia* (Leiden: Brill, 1999), 73–83.
- Lis Brack-Bernsen, “The ‘Days in Excess’ from MUL.APIN: On the ‘first intercalation’ and ‘water clock’ schemes from MUL.APIN”, *Centaurus* 47 (2005), 1–29.
- R. Watson and W. Horowitz, *Writing Science Before the Greeks: A Naturalistic Analysis of the Babylonian Astronomical Treatise MUL.APIN* (Leiden, 2011).
- D. Brown, *Mesopotamian Planetary Astronomy-Astrology* (Groningen: Styx, 2000), chapter 3.

4. ASTRONOMY IN THE NEO-ASSYRIAN LETTERS AND REPORTS

- A. L. Oppenheim, “Divination and Celestial Observation in the Last Assyrian Empire”, *Centaurus* 14 (1969), 97–135.
- H. Hunger and D. Pingree, *Astral Sciences in Mesopotamia* (Leiden: Brill, 1999), 116–139.
- D. Brown, “The Scientific Revolution of 700 BC”, in A. MacDonald, M. W. Twomey, and G. J. Reinink (eds.), *Learned Antiquity: Scholarship and Society in the Near-East, the Greco-Roman World, and the Early Medieval West* (Leuven: Peeters, 2003), 1–12.

5. THE ASTRONOMICAL DIARIES

- A. Sachs, “A Classification of the Babylonian Astronomical Tablets of the Seleucid Period”, *Journal of Cuneiform Studies* 2 (1948), 271–290.
- A. Sachs, “Babylonian Observational Astronomy”, *Philosophical Transactions of the Royal Society of London*, A 27 (1974)6, 43–50.
- F. Rochberg-Halton, “The Babylonian Astronomical Diaries”, *Journal of the American Oriental Society* 111 (1991), 323–332.
- H. Hunger and D. Pingree, *Astral Sciences in Mesopotamia* (Leiden: Brill, 1999), 139–159.

6. MEASUREMENT OF POSITION AND TIME: NORMAL STARS, THE ZODIAC, WATER CLOCKS, *ṢIQPU* STARS

- A. Jones, “A Study of Babylonian Observations of Planets Near Normal Stars”, *Archive for History of Exact Sciences* 58 (2004), 475–536.
- D. Brown, J. Fermor, and C. Walker, “The Water Clock in Mesopotamia”, *Archiv für Orientforschung* 47 (1999–2000), 130–148.
- J. Fermor and J. M. Steele, “The Design of Babylonian Waterclocks: Astronomical and Experimental Evidence”, *Centaurus* 42 (2000), 210–222.
- P. J. Huber, “Ueber den Nullpunkt der babylonischen Ekliptik”, *Centaurus* 5 (1958), 192–208.
- J. M. Steele, “Celestial Measurement in Babylonian Astronomy”, *Annals of Science* 64 (2007), 293–325.

7. GOAL-YEAR TEXTS, ALMANACS, NORMAL STAR ALMANACS

- J. M. Steele, “Goal-Year Periods and Their Use in Predicting Planetary Phenomena”, in G. Selz and K. Wagensohnner (eds.), *The Empirical Dimension of Ancient Near Eastern Studies – Die empirische Dimension altorientalischer Forschungen* (Wien: LIT Verlag, 2011), 101–110.
- J. M. K. Gray and J. M. Steele, “Studies on Babylonian Goal-Year Astronomy I: A Comparison Between Planetary Data in Goal-Year Texts, Almanacs and Normal Star Almanacs”, *Archive for History of Exact Sciences* 62 (2008), 553–600.
- J. M. K. Gray and J. M. Steele, “Studies on Babylonian Goal-Year Astronomy II: The Babylonian Calendar and Goal-Year Methods of Prediction”, *Archive for History of Exact Sciences* 63 (2009), 611–633.
- J. M. Steele, “Eclipse Prediction in Mesopotamia”, *Archive for History of Exact Sciences* 52 (2000), 421–454.
- L. Brack-Bernsen, L., “Goal-Year Tablets: Lunar Data and Predictions”, in N. M. Swerdlow (ed.), *Ancient Astronomy and Celestial Divination* (Cambridge, MA: The MIT Press, 1999), 149–177.

8. MATHEMATICAL ASTRONOMY (I): PLANETARY SCHEMES

- M. Ossendrijver, “Babylonian Mathematical Astronomy”, in C. Ruggles et al. (eds.), *Handbook of Archaeoastronomy and Ethnoastronomy* (New York: Springer, 2015), 1863–1870.
- O. Neugebauer, “Babylonian Planetary Theory”, *Proceedings of the American Philosophical Society* 98 (1954), 60–89.
- M. Ossendrijver, *Babylonian Mathematical Astronomy: Procedure Texts* (New York: Springer, 2012), ch. 3.

9. MATHEMATICAL ASTRONOMY (II): LUNAR SCHEMES

- A. Aaboe and J. A. Henderson, “The Babylonian Theory of Lunar Latitude and Eclipses According to System A”, *Archives Internationales d’Histoire des Sciences* 25 (1975), 181–222.
- M. Ossendrijver, *Babylonian Mathematical Astronomy: Procedure Texts* (New York: Springer, 2012), ch. 4.

10. SCHEMATIC ASTRONOMY IN THE LATE PERIOD

- J. M. Steele, “Shadow-Length Schemes in Babylonian Astronomy”, *SCIAMVS* 14 (2013), 3–39.
- J. M. Steele, *Rising Time Schemes in Babylonian Astronomy* (Dordrecht: Springer, 2017).

11. LATE BABYLONIAN ASTROLOGY

- F. Rochberg, “Babylonian Horoscopy: The Texts and their Relations”, in N. M. Swerdlow (ed.), *Ancient Astronomy and Celestial Divination* (Cambridge, MA: The MIT Press, 1999), 39–60.
- J. M. Steele, “Real and Constructed Time in Babylonian Astral Medicine”, in J. Ben-Dov and L. Doering (eds.), *The Construction of Time in Antiquity: Ritual, Art and Identity* (Cambridge: Cambridge University Press), in press.
- M. J. Geller, *Melothesia in Babylonia: Medicine, Magic and Astrology in the Ancient Near East* (Boston: De Gruyter, 2014).

12. ASTRONOMY AND ITS USES

- D. Brown, *Mesopotamian Planetary Astronomy-Astrology* (Groningen: Styx, 2000), chapter 5.
- J. M. Steele, “The Length of the Month in Babylonian Calendars in the First Millennium BC”, in J. M. Steele (ed.), *Calendars and Years: Astronomy and Time in the Ancient Near East* (Oxford: Oxbow Books, 2007), 133–148.
- J. M. Steele, “Astronomy and Culture in Late Babylonian Uruk”, in C. L. N. Ruggles (ed.), *Archaeoastronomy and Ethnoastronomy: Building Bridges Between Cultures* (Cambridge: Cambridge University Press, 2011), 331–341.

13. THE LEGACY OF BABYLONIAN ASTRONOMY IN OTHER CULTURES

- O. Neugebauer, “From Assyriology to Renaissance Art”, *Proceedings of the American Philosophical Society* 133 (1989), 391–403.
- A. Jones, “Evidence for Babylonian Arithmetical Schemes in Greek Astronomy”, in H. D. Galter, *Die Rolle der Astronomie in den Kulturen Mesopotamiens* (Graz: Kult, 1993), 77–94.
- J. M. Steele, “Visual Aspects of the Transmission of Babylonian Astronomy and its Reception into Greek Astronomy”, *Annals of Science* 68 (2011), 453–465.
- D. Pingree, “Legacies in Astronomy and Celestial Omens”, in S. Dalley (ed.), *The Legacy of Mesopotamia* (Oxford: Clarendon Press, 1998), 125–138.
- F. Rochberg-Halton, “Elements of the Babylonian Contribution to Hellenistic Astrology”, *Journal of the American Oriental Society* 108 (1987), 51–62.

