HOMEWORK ASSIGNMENTS    AST 102IN    STARS, GALAXIES, UNIVERSE

for the classes of Dr. Gary Mechler    for “Stars and Galaxies” textbook edition 9, ©2016, Assignments revised for Fall 2018

The letter “N” following the number of an assignment connotes that this assignment is to be done around the due date and is Not actually handed in for scoring. Material included in the “N” assignments is testable as with the material in all other assignments.

On problems requiring calculations, you must show the calculation setups. The calculations themselves may be done with a calculator.

Chapters start with “Guideposts”. Read them, even if the assignment says to start with Section 1. For example, Ass’t. 3 says to read Ch. 2.1. You start with the Guidepost. Also: Read every “How Do We Know”

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Assignment 1 — Foundational

Introductory Course Note Set (bookstore)    

Assignment 2

“Study Tips: How to Study Astronomy” (handout) 
Sagan article: “Why We Need to Understand Science” (handout) 
How/know? 1.1: “...Scientific Method, p. 8 
How/know? 2.1: “Scientific Models”, p. 20 
How/know? 2.2: “Pseudoscience”, p. 26 
How/know? 2.3: “Evidence...Foundation”, p. 28 
How/know? 2.4: “Sci Arguments”, p. 29

Assignment 3

Ch. 2, "A User’s Guide to the Sky" p. 11
Ch. 2.1, “Stars and Constellations,” pp. 12-17 to Ch. 2.2
Ch. 6, "Light and Telescopes," p. 103
Ch. 6.1, "Radiation: Info from Space", pp. 104-106 Q. 3,4,8; P. 2; D. cosmic rays
Ch. 9.4 sub-section only “Lum., Radius, and Temp.” pp. 184-185

Due date: Wed, Sep 05    (Monday, 3rd Labor Day)
Introductory Course Note Set (bookstore) question sheets (handed out) Responses go on question sheets.

Due date: Wed, Sep 12
“Study Tips: How to Study Astronomy” (handout) question sheet (download) Responses go on question sheets. 
Sagan article: “Why We Need to Understand Science” (handout) question sheet (download) Responses go on question sheets.
How/know? 1.1: “...Scientific Method, p. 8 list 3 significant points
How/know? 2.1: “Scientific Models”, p. 20 list 3 significant points
How/know? 2.2: “Pseudoscience”, p. 26 list 3 significant points
How/know? 2.3: “Evidence...Foundation”, p. 28 list 3 significant points
How/know? 2.4: “Sci Arguments”, p. 29 list 3 significant points

Due date: Wed, Sep 19
Ch. 2, "A User’s Guide to the Sky" p. 11 Q. 1-3,6-8,12; P. 1,2,7-9 (Either get answers for the preceding problems from Table 2.1 on p.17 or, for extra credit, calculate- must show calculations. You can also use the table to confirm.)
Ch. 2.1, “Stars and Constellations,” pp. 12-17 to Ch. 2.2
Ch. 6, "Light and Telescopes," p. 103
Ch. 6.1, "Radiation: Info from Space", pp. 104-106 Q. 3,4,8; P. 2; D. cosmic rays
Focus on Fundamentals 3: “Temp, Heat, Thermal E”, p. 136 List 3 significant points
Ch. 9.4 sub-section only “Lum., Radius, and Temp.” pp. 184-185 P. 13 (Extra Credit)

TEST 1 Date: Mon, Oct 01
Assignment 3N

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<thead>
<tr>
<th>Due date:</th>
<th>Wed, Oct 03</th>
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<tbody>
<tr>
<td>Ch. 6.2, &quot;Telescopes&quot; to end of chapter, pp. 107-126</td>
<td>Q. 9,12,14-18; P. 5,6,12,13; D. seeing, CCD</td>
</tr>
<tr>
<td>Ch. 7, &quot;Atoms and Spectra,&quot; p. 130</td>
<td>Q. 2,3,6-9,11-13,15,17,21,22; P. 1,3-5,8; D. molecule</td>
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<tr>
<td>Ch. 7.1, &quot;Atoms&quot; and Ch. 7.2, &quot;Light and Matter&quot; pp. 131-138</td>
<td>How/know? 8.1: &quot;Confirmation, Consolidation&quot; p. 161 list 3 significant points</td>
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<td>How/know? 8.2: &quot;Scientific Confidence, p. 170 list 3 significant points</td>
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<td>How/know? 21.1: &quot;How...Unify the Details&quot;, p. 474 list 3 significant points</td>
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<td>How/know? 22.1: &quot;Data Manipulation&quot;, p. 496 list 3 significant points</td>
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Assignment 4

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<tr>
<th>Due date:</th>
<th>Wed, Oct 17</th>
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<tr>
<td>Ch. 1, &quot;Here and Now&quot;, pp. 1-8</td>
<td>Q. 3,8,9,15; P. 10,11 (use 100,000 ly for the MW's diameter)</td>
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<tr>
<td>Ch. 9, &quot;The Family of Stars&quot;, pp. 175-189 up to Sec. 9.5, &quot;Star Masses--Binary Stars&quot;</td>
<td>Q. 4,6,9,12-14,16; P. 1 (skip AU),5 (distance &amp; parallax columns only),9,12; (You might use Table 2.1 on p. 17 and/or Table 9.1 on page 182.)</td>
</tr>
<tr>
<td>Skip Sub-section, &quot;Lum, Radius, Temp&quot; of Sec 9.4; it was covered in Ass't. 3.</td>
<td>How/know? 4.2: &quot;Hyp., Theory, &amp; Law&quot;, p. 69 describe each</td>
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<td>How/know? 5.2: &quot;Testing...by Prediction&quot;, p. 94 list 3 significant points</td>
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TEST 2 Date: Wed, Oct 24

Assignment 5

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<th>Due date:</th>
<th>Wed, Oct 31</th>
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<tr>
<td>Ch. 9.5, &quot;Star Masses--Binary Stars&quot; to end of chapter, pp. 190-200</td>
<td>Q. 22,29-31; P. 16,17</td>
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<tr>
<td>Ch. 15.5, Read only sub-section &quot;Stellar Populations,&quot; pp. 337,340 (Skip the two-page color spread) Also read Table 15.1, &quot;Stellar Populations,&quot; p. 341</td>
<td>Q. 1,2,4,5,10,25; P. 2</td>
</tr>
<tr>
<td>Ch. 10, &quot;The Interstellar Medium&quot;, pp. 204-220</td>
<td>Q. 2,3,8,11; P. 7,14; D. neutrino (See glossary.)</td>
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<td>Ch. 11, &quot;The Formation/Structure of Stars&quot;, pp. 224-243</td>
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Assignment 6

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<th>Due date:</th>
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<tr>
<td>Ch. 12, &quot;Stellar Evolution&quot;, pp. 247-268</td>
<td>Q. 1,3,9,11-13,17,19,22,25,27-29; P. 3,5 (all ages in years) Hint for P. 5: plug in a mass value and calculate age, then iterate, Trying different mass values to tenths of a solar mass, until you get an age of 5 billion years.</td>
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<td>How/know? 9.1: Chains of Inference, p. 191 list 3 significant points</td>
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<td>How/know? 10.1: &quot;Separating Facts from Hypotheses&quot;, p. 215 list 3 significant points</td>
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<td>How/know? 12.1: &quot;Mathematical Models&quot;, p. 250 list 3 significant points</td>
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**Assignment 6N**

Due date: **Wed, Nov 14** (Monday 12th Veteran’s Day)

NOTE: The problems only in this assignment may be handed in for extra credit. I will not score the Questions.

- Ch. 13, “The Deaths of Stars”, pp. 272-293
- Ch. 14, “Neutron Stars & Black Holes”, pp. 296-317

Q. 1-5, 9-13, 21, 22; P. 1, 3, 7

- Ch. 14, “Neutron Stars & Black Holes”, pp. 296-317

Q. 1, 4, 5, 7, 18, 19, 21, 23, 24; P. 9 (HINT: C=2πR); D. event horizon, Rs, time dilation

**TEST 3** Date: **Wed, Nov 21**

**Assignment 7**

Due date: **Mon, Nov 26**

- Ch. 19, Sub-section "Life in Other Planetary Systems" to end of chapter,” pp. 434-439
- How/know? 18.1: “Reasoning/Analogy”, p. 393
- How/know? 19.2 “UFOs & Aliens”, p. 435

Q. 18, 23, 24; P. 4, 5 (Use textbook hint along with nearest subclass from info given in Table 12.2, p. 254)

D. habitable zone, SETI

**Assignment 8**

Due date: **Mon, Dec 03**

- Ch. 15, "The Milky Way Galaxy," pp. 321-336 (except Ch. 15.5, “Stellar Pops,” covered in Ass’t. 5)
- Ch. 16, "Galaxies", pp. 348-370
- How/know? 7.1: “Quantum Mechanics”, p. 133
- How/know? 18.2: “Science: System of Knowledge,” p. 401

Q. 2, 3, 8, 11, 19, 20, 23, 27 P. 2 (Note: A=πr² and compare the earth-viewed disk area with the Milky Way disk. Use 12.5 kpc for the radius of the MW), 9, 11, 12

Q. 1, 6, 8, 12, 14, 15, 26 (just answer first part of question; no need to look for explanation), 27; P. 1 (easier if you use metric system), 2, 8

**Assignment 8N**

Due date: **Wed, Dec 05**

- Ch. 17, "Active Galaxies & Supermassive Black Holes," pp. 374-387
- Ch. 18, "Modern Cosmology", pp. 390-417

Q. 5, 8, 11, 12, 15, 18, 19; P. 11

**TEST 4** Date: **Wed, Dec 12**

**Assignment 9**

Deadline: **Wed, Dec 12**


list significant points, the more, the merrier—hand in with Test 4

“Never regard study as a duty but as an enviable opportunity to learn...for your personal joy and to the profit of the community to which your later works belong.” — Albert Einstein