

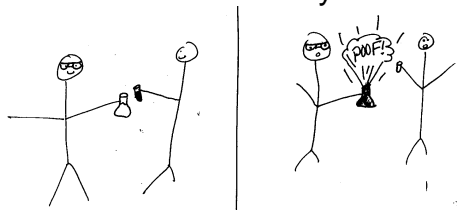
# 305 FH

Chem 112

Spring 2018

General Chemistry Laboratory B

Loyola University Chicago



Senior Laboratory Coordinator: Angela E. Boerger

Office Hours: Monday 10:30 – 11:15, and always by appointment

Office Location: 428 Flanner Hall, Office Phone: 773-508-3135

Email: [aboerge@luc.edu](mailto:aboerge@luc.edu)

**Put Chem 112, your section #, and your TA's name in the subject**

Laboratory Coordinator: Dr. Katrina Binaku

Office Hours: Monday 1-2pm, Thursday 10-11am, and by appointment

Office Location: 104 Flanner Hall, Office Phone: 773-508-8715

Email: [kbinaku@luc.edu](mailto:kbinaku@luc.edu)

**Put Chem 112, your section #, and your TA's name in the subject**

Laboratory Coordinator: Ketevan Kamkamidze

Office Hours: Tuesday 1-2pm and always by appointment

Office Location: 200A Flanner Hall, Office Phone: 773-508-2687

Email: [kkamkam@luc.edu](mailto:kkamkam@luc.edu)

**Put Chem 112, your section #, and your TA's name in the subject**

Laboratory Coordinator: Dr. David Klinger

Office Hours: Monday 4-5 PM, and by appointment

Office Location: 408 Cudahy Science Hall, Office Phone: 773-508-3432

Email: [dklinger@luc.edu](mailto:dklinger@luc.edu)

**Put Chem 111, your section #, and your TA's name in the subject**

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**Welcome to Chem 112. We are looking forward to working with you this semester!**

Appropriate clothing must be worn that minimizes potential chemical contact with your skin. Shoes that adequately cover the entire foot are required. Sandals, open-toes shoes, perforated shoes, open-backed shoes are not acceptable. **No skin should be exposed on your feet or legs, so clothing that covers and protects your body from the waist down (including your ankles) should be worn.** Additionally, a lab coat and goggles will be required.

Participation is mandatory. You are not allowed to make up a quiz or a lab in another section of Chemistry 112. Missing 2 of the labs, which is over 20% of the lab work, is significant and unacceptable and will result in academic failure, as will missing 1 or both of the Practical

Quizzes. Please look at the schedule at the end of this syllabus and consider the negative impact that missing one of the hands on laboratory sessions will have on your educational experience, including your performance on the Practical Quizzes. It is in your best interests to register for a section that does not conflict with other obligations. Students should not enroll in a lab section that they cannot fully attend.

Students who do not have a C- or better in the prerequisite class, General Chemistry Laboratory A (Chem 111), and students who are not concurrently enrolled in or have not completed General Chemistry 102 or 106 with a grade of C- or better will be removed from the class.

Failure to adhere to any lab safety rules can result in expulsion from the lab session and or course with no opportunity for make-ups.

## **REQUIRED ITEMS**

- 1) The Chem 112 Laboratory Manual will be provided to you at no charge during the first class. **It is essential that you read the experiment before coming to class** so that you can complete the lab and the write up in a timely fashion.
- 2) Safety goggles. These must be type G, H or K goggles and must meet or exceed ANSI Z87.1 requirements. Safety glasses do not meet our requirements.
- 3) Lab Coat.
- 4) A laboratory notebook for the qualitative analysis experiments. This is a composition type notebook with the pages bound so that they cannot be torn out. A spiral notebook is not acceptable.
- 5) You will need a scientific calculator for most experiments and Practical Quiz 2.
- 6) The use of a non-erasable pen is required for all written work. No white out is allowed.

## **ASSESSMENT**

The grading scale is as follows. There will be no change in the grading scale or in the number of points. We will not grade on a curve, drop a grade, or round up.

% total	Grade
94 - 100	A
90 - 93	A-
87 - 89	B+
84 - 86	B
80 - 83	B-
77 - 79	C+
74 - 76	C
70 - 73	C-
65 - 69	D+

60 – 64	D
0-59	F

112 Breakdown of Points Available

Activity	Points	Origin
a NIEs Qual II	10	in lab
a Qual a Prep Hwk	5	sakai
a Qual I Hwk	5	sakai
a Qual I report	16	manual
a Qual III Hwk	5	sakai
a Qual III report	19	manual
a Qual III Social Justice Lead Poisoning in Children Discussion	4	sakai
a Qual IV Hwk	5	sakai
a Qual IV report	20	manual
a qual IV Social Justice, Teratagens and Pregnancy Discussion	4	sakai
e Notebook	35	in lab
e Qual Gen Unknown (Practical 1)	20	quiz
cleanup (3 points per qual group, reported with notebook points)	12	in lab
Lab 1a: Calcium carbonate pre-lab quiz	4	sakai
Lab 1b: CaCO <sub>3</sub>	20	in lab
Lab 1c: CaCO <sub>3</sub> discussion	4	sakai
Lab 1c: calcium carbonate post discussion quiz	1	sakai
cleanup	3	in lab
Lab 2a :spinach pre-lab	4	sakai
Lab 2b: Spinach	20	in lab
Lab 2c: Spinach post lab homework	5	sakai
cleanup	3	in lab
Lab 3a: Kc HBB pre-lab quiz	4	sakai
Lab 3b: Kc HBB	20	in lab
Lab 3c: Kc HBB Hwk	5	sakai
cleanup	3	in lab
Lab 4a: pKa Nicotinic Acid pre-lab quiz	4	sakai
lab 4b: pKa Nicotinic Acid	20	in lab
cleanup	3	in lab
Practical Quiz 2	30	quiz
Safety	10	in lab
z Check Out	10	in lab
<u>Total Points</u>	333	

Interactions with TAs: In order to increase the amount of individual assistance you receive in lab, Teaching Assistants will participate in delivering this course. If at any time during the semester, you have any questions or concerns about the behavior of your Teaching Assistant, please contact the Instructor. Your written work, as well as TA observations will serve as the basis for earning points and informing me of your progress.

Written work will be graded with an emphasis on correct use of significant digits, consistency of results (do data and observations match conclusions?), appropriateness and correctness of analysis, and thoroughness in responses. (Although efforts are made to ensure that all TAs use the same grading scale, on rare occasions, I find it necessary to scale a lab section's averages to adjust for differences between TA's grading. When this is necessary, I adjust the average lab score mean to the average quiz mean.)

A one point penalty will be assessed for any written work which is not done in non-erasable pen, or if white out is used. 2 points will be deducted from the notebook score for every week that a proper laboratory notebook is not brought to class.

Laboratory work in this second semester of general chemistry lab will be divided into two parts.

- 1) For the qualitative analysis portion, you will prepare and use a formal scientific notebook and write a formal lab report on your unknowns for each group covered. This section will include a qualitative analysis practical. The Qualitative Analysis Practical will be an unknown potentially containing ions from all groups covered. **You may use your own graded formal reports, lab manual, formal scientific notebook, and pre-lab lectures from Chem 112 on the Qualitative Analysis Practical.**
- 2) The remaining labs cover various topics, and will be followed by a practical quiz. In part, a laboratory practical quiz requires a student to demonstrate knowledge and skills by performing tasks in the laboratory. In this way, a student's ability to use equipment properly and demonstrate correct technique can be evaluated. A practical lab quiz will also cover basic understanding of the fundamental models of chemistry illustrated in the laboratory experiments. Questions of this kind will ask you to analyze data similar to laboratory experiments you performed. **You may use your own graded data sheets, lab manual, syllabus, pre-lab lectures and tutorials from Chem 112 on the Practical Quiz.**

Safety points will be awarded on the basis of safe conduct in the lab. A safe lab environment is essential, and unsafe actions will definitely result in grade degradation. The following is a partial list of ways you can lose safety points:

- Coming late to class, after the pre-lab lecture has started
- Not bringing goggles to lab
- Not wearing your goggles consistently in lab
- Not keeping your equipment drawer locked and/or in good condition
- Not adhering to Disposal Instructions indicated in each lab handout
- The Lab-Quest equipment used is breakable, and requires special care. You and your partner will be assigned a box to use, and if the equipment is found to have been handled negligently, points will be deducted from both your safety points and your lab score.

## ATTENDANCE

- Labs and quizzes can only be completed in a staffed lab. Participation is mandatory, and every student is expected to attend every scheduled class.
- You must attend the section in which you are enrolled.
- There is a point value associated with the work accomplished in each class, and you will not be able to earn points for classes that you do not attend.
- If the university is open, you are expected to attend class and to be on time.
- If you arrive to lab after the conclusion of the pre-lab lecture, you will not be allowed to perform the lab.
- You will not be permitted to attend another lab section to makeup a missed lab.

You cannot perform the qualitative analysis practical without having completed all prior required qualitative analysis labs. Therefore, if you miss one of the qualitative analysis labs, there is a schedule for one make-up. Any missed qualitative analysis labs must be made up in sequence, and within one week of the absence.

If you miss one of the remaining 4 labs, contact your primary laboratory coordinator immediately.

Please request sample data for that lab. Sample data is data similar to what you may have obtained in lab and may help you study for Quizzes. (Sample data is not the Virtual Lab.) You will be responsible for understanding the missed material, and **normal deadlines will apply for completing homework and Pre-Lab Quizzes.**

You may complete a 23 point Virtual Lab Assignment one time over the course of the semester. This assignment is intended to replace an absence in lab which is **unavoidable and for a significantly important reason**. You may not use it to replace a poor lab score or homework score. You will be responsible for understanding the missed material, and normal deadlines will apply for completing homework and Pre-Lab Quizzes.

**The due date/time for the Virtual Lab assignment can be found on the schedule at the end of the syllabus.** Please turn in the assignment by dropping it off in the department office, and ask that it be put into Angie's mailbox with verification of the date and time turned in. Directions for this assignment can be found at the end of the second part of the Lab Manual. **Direct any questions you have to Angie, aboerge@luc.edu.** If you complete the virtual lab, you will not receive any feedback on it until the end of the semester.

*If 2 or more labs are missed (including the Virtual Lab Option), or if either Practical Quiz is missed, it will result in an academic failure regardless of the overall points earned in the class.*

**IMPORTANT:** Students wanting to drop lecture after midterm may stay in the co-req lab only if midterm grade, posted in LOCUS, is a D or better. Students should continue to attend lecture until the week of the drop date to gain as much background knowledge as possible. For Spring 2018 students wishing to drop lecture, and have a mid-term grade of D or better, can seek assistance from the Department of Chemistry and Biochemistry office beginning **Monday, March 19<sup>th</sup> at 9:00 am through Monday, March 26<sup>th</sup> at 4:00 pm.** Students with a midterm grade of F must drop the co-req lab along with the lecture. No exceptions.

Students must make information concerning time conflicts with University sponsored events available to the instructor at the beginning of the semester.

If unintentional errors are discovered in the syllabus, the instructor reserves the right to revise as necessary.

## **ROLE OF TEACHING ASSISTANTS**

In each lab session, your primary interaction could be with a Teaching Assistant. The function of a TA is to help you get good data in a safe fashion, and to provide individual help on each lab when necessary. The role of the Laboratory Coordinator is more behind the scenes: to plan the curriculum, prepare both handouts and powerpoints, and to train the TAs so that the lab experience is educational, fair, and effectively run for students enrolled in all of the sections. Please know that the Lab Coordinators are available to you if there are any questions or concerns that the TAs cannot handle appropriately.

## **Tutoring**

The Tutoring Center is offering free walk-in tutoring in Biology, Chemistry, Math, Physics, and Statistics. To see a full schedule of times, or to find more information on tutoring services, visit the Tutoring Center online at [www.luc.edu/tutoring](http://www.luc.edu/tutoring).

## **GENERAL POLICIES**

Completed written work will be stored in your lab folder. Your laboratory folder will be arranged alphabetically with other students in your section, and at the end of the semester should be complete. You may take the contents of your folder home before a practical quiz in order to study, but you should return the folder when you complete the quiz.

Checkout is your final opportunity to verify that the scores submitted to Sakai by your TA are indeed correct. If there are any discrepancies in the scores submitted by your TA, your proof of having earned a specific grade on a particular lab is the presence of that graded lab in your lab folder at the end of the semester.

Each student will be assigned a drawer with glassware and equipment. At the beginning of the semester, the drawer contents will be checked for completeness. It is essential that you clean the equipment used after an experiment is completed. The drawers may be checked sporadically. If glassware is broken, the student is responsible for obtaining a replacement item at the main stockroom from your Teaching Assistant. At the end the semester, the drawer will be checked out again for completeness/cleanliness.

## **Regarding Sakai and Technical Difficulties**

It is *strongly encouraged* that all required submissions to Sakai as well as writing lab reports, opening course/data/experiment files, be done on a reliable wired internet connection [not wireless], that of which the University itself provides in the Information Commons and various computer labs on the Lake Shore Campus.

Under NO circumstances will excuses of “technical difficulties” be accepted as this syllabus is stating all students should use a wired internet University computer [not wireless internet] to

submit work in Sakai, write lab reports, open course/data/experiment files. This list is not exhaustive and it should be noted that any activities this course may require a computer or internet connection for should be completed using University computers with wired internet connection. Use of home internet [wired or wireless], University wireless, or public wireless is at your, the student's, own risk. It is not prohibited but as Instructor has stated in this syllabus, Instructor is not responsible for technical difficulties of non-University devices [cell phone, tablet, home/work/public wireless internet or computer]. Do not submit items in Sakai using a cell phone or a tablet device as these do not count as reliable internet connection tools."

## **ACADEMIC INTEGRITY**

We wish to make it clear that the standard of academic integrity and personal honesty delineated in the College of Arts & Sciences Statement on Academic Integrity is expected of every student and will be enforced. Details can be found at [http://www.luc.edu/cas/faculty\\_resources.shtml](http://www.luc.edu/cas/faculty_resources.shtml)

Cheating can take many forms in lab, but the most common form is to copy data and answers to analysis questions, or to share files/answers for homework assignments. The reports and data/analysis you submit for marking must be your own, and if it is not, no credit will be awarded for the entire lab, nor will make-ups be granted. Additionally, findings of dishonest academic behavior are reported to the Chair of the Chemistry Department and to the Dean's Office, and are entered into an individual's record. A copied answer or report will result in a penalty for all students involved.

## **DISABILITIES ACCOMODATIONS**

If you have a documented disability and wish to discuss academic accommodations, please see your primary Lab Coordinator as soon as possible. (The Coordinator of Services for Students with Disabilities is located in the Sullivan Center for Student Services, Suite 260, 508-7714, and must be contacted independently.) Accommodations are not retro-active; your promptness in delivering an SSWD letter to the Instructor is necessary for accommodations to begin.

## **EDUCATIONAL GOAL**

In this second semester of general chemistry laboratory, my purpose as your chemistry instructor is to continue to provide a hands on introduction to experimental methods of scientific investigation in chemistry. The fundamental models of chemistry discussed in lecture will provide the basis for understanding the experimental laboratory work. Each lab will provide a practical opportunity for you to gain competence with the basic techniques of lab work and the practical experience necessary to understand its significance. It is my wish that this laboratory experience will encourage students who are seeking intellectual challenges along with an understanding of the chemical principles in the laboratory.

Conducting experiments and collecting data to test the validity of theories and models requires a different set of skills than those required for success in the lecture part of a general chemistry course. During a laboratory activity, each student's hands, mind, eyes, as well as other senses are focused on the task at hand. Success in the lab involves skills in making perceptive qualitative observations and accurate quantitative measurements.

With each laboratory experiment, I intend to pose relevant questions, and along with TAs, to help each student to execute a laboratory approach which will yield reliable data related to these questions. Each student is required to obtain data and to depend upon this data when answers to these questions are drafted. Each lab will be structured enough so that you should not feel lost or confused, but not so structured that you will find it unnecessary to think for yourself.

## **INSTRUCTIONAL PHILOSOPHY**

I believe in a Carl Rogers type of “freedom to learn” educational philosophy; in my classroom and lab I encourage students to “self-actualize” in obtaining a functional knowledge of chemistry and consequently earning a specific grade. I expect that all students will consciously do the work required to earn the grade they seek. In that way, I can in good conscience sign a passing grade report.

## **IDEA: Individual Development and Educational Assessment**

Objective 1: Learning to apply course materials (to improve thinking, problem solving, and decisions)

- Understand and apply proper labeling to include a value, units, and chemical identity, as well as pertinent stoichiometry and other relevant calculations.
- Understand and apply the rules for obtaining the correct number of significant figures with analysis of personally taken data.
- Execution and analysis of results.
- Analysis and understanding of the meaning of percent relative error.
- Understanding the creating graphs and the meaning of graphs.
- Understanding and analysis of the result of errors in the procedure execution.
- Apply the separation and identification scheme for all the qualitative analysis procedures.

Objective 3: Gaining factual knowledge (terminology, classifications, methods, trends).

- Competent recording of observations.
- Produce correct Net Ionic Equations and understand their meaning.
- Use best practices with balances.
- Competent use of volumetric glassware.
- Proficient use of burets.
- Understand the separation and identification scheme for all the qualitative analysis procedures.

## **LOST AND FOUND**

Any items mistakenly left in lab will be taken to the Chemistry Department office, 125 Flanner Hall, and can be identified and claimed there. **Please put your name on your data sheets, lab manuals, calculators and other personal items.**



## Safety in the Laboratory

Laboratory Safety is everyone's responsibility. By registering for and participating in this course you agree to abide by the following rules. Failure to follow these rules constitutes grounds for withdrawing the offending student from the lab session and or course at any time.

1. To wear approved safety goggles at all times in the laboratory.
2. To know both the location of and how to use eye washes.
3. Not to wear contacts in the laboratory.
4. To wear appropriate clothing that minimizes potential chemical contact your skin. Shoes that adequately cover the entire foot are required. Sandals, open-toes shoes, perforated shoes, open-backed shoes are not acceptable. **No skin should be exposed on your feet or legs, so clothing that covers and protects your body from the waist down (including your ankles) should be worn.** You must be dressed appropriately to perform an experiment, including your lab coat and goggles.
5. To know both the location of and how to use the safety showers.
6. To know both the location of and how to use the fire extinguishers.
7. Not to perform unauthorized and unknown experiments, nor work in the lab without appropriate supervision.
8. Not to take chemicals or equipment out of the laboratory.
9. Not to engage in horseplay or clowning around that might endanger you or other students.
10. Not to eat, drink, chew gum, or smoke anything in the laboratory **at any time**. No head sets or cell phones.
11. To keep your lab space clean and tidy.
12. To ask your instructor or TA when in doubt about procedures.



By using common sense and following these rules, it is unlikely that you or your classmates will be involved in or injured in a mishap in the laboratory.

While it is very important that you do your part to prevent an accident from occurring, it is just as important to know what to do if someone is injured.



Critical Injuries include: glass in his/her eye(s), serious cuts, severe chemical burns, severe fire burns, seizures. **Immediately call for help using either the lab phone (security number is taped to phone handle) or the emergency phone in the hallway directly outside the laboratory.** Anyone with chemicals or foreign objects in his/her eye(s) will be escorted to the Wellness Center or to the hospital.

### **First Aid Basics**

Minor Cuts: Band-Aids are available. If you bleed through one Band-Aid, another should be applied over the first. If you bleed through two Band-Aids in a few minutes, or if there is any possibility of broken glass in a cut, you will be escorted to the Wellness Center.

Minor Burns from Fire: If the skin is unbroken, run cool water over the area or submerge in a cool water bath for at least 5 min. Apply a cool, damp towel.

Chemicals in Eyes: Immediately flush eyes with water at the eye wash. Continue with flush for at least 10 minutes. You will probably need to hold the affected eye(s) open to do this properly.

Chemicals on Skin: Dust any dry chemical off with a dry towel and then flush with water. Flush any wet chemical from the skin immediately with water at the sink or safety shower. If clothing is affected, remove clothes before rinsing! Continue with rinse for at least 10 minutes.

## **Fire Hazards**

The primary heat source in this laboratory is the Bunsen burner, which is fueled by natural gas. A lit Bunsen burner is a small, controllable fire, but the heat generated by the burner fire can be quite hazardous in certain circumstances. It can serve as an ignition source for other combustible materials in the lab such as paper (lab handouts, paper towels, filter paper, etc.), plastics (wash bottle), flammable liquids (acetone, ethanol). A burner fire can also ignite clothing and hair. Proper operation of a burner and the absence of combustible materials in the proximity of the burner will significantly reduce the risk of a fire. Each lab is equipped with a fire extinguisher, fire blanket, and safety shower, which should be used in a fire emergency.

### Procedure in a case of a fire:

Remain calm; alert the instructor and your immediate neighbors. Personal safety, yours and others in the labs, is always the top priority. A small fire in a small container can be suffocated by covering it with a watch glass or inverted beaker. With a somewhat larger fire, you need to decide whether or not you think you can control it with a fire extinguisher.

### Use of a Fire Extinguisher:

Located by the doors in both labs; a back-up fire extinguisher is located at the west end of the floor. Maintain an escape position; i.e. stay between the fire and the doorway. **Break the plastic ring, pull out the metal ring, release the hose from the bracket, direct the hose at the base of the flames, and press the lever down.**

Note: the fire extinguishers are heavy and not particularly easy to direct. These are multi-purpose dry chemical extinguishers, safe for anything we use in lab.

## **305 FH**

### Chem 112 Tentative Spring 2018 Schedule

#### **Chem 112 Order of Labs**

	Qualitative Analysis I
	Qualitative Analysis III
	Qualitative Analysis IV
	Qualitative Analysis Unknown (Practical #1)
Lab #1	Percent Calcium Carbonate in a Mixture
Lab #2	Separation of Natural Pigments in Spinach by Column Chromatography
Lab #3	Using Spectroscopy to Determine the Equilibrium Constant for Bromothymol Blue
Lab #4	Determination of the pKa and Molar Mass of Nicotinic Acid by Titration

See next page for full calendar schedule of all laboratory experiments. It is your responsibility to know what experiment is being completed on which day, and when you have laboratory!!!

Chem 112 Tentative Spring 2018 Schedule

Month	Mon	Tue	Wed	Thu	Fri
<b>Jan 2018</b>	<b>15</b> MLK Day No Lab	<b>16</b> No Lab	<b>17</b> No Lab	<b>18</b> No Lab	<b>19</b> No Lab
	<b>22</b> Qual Prep	<b>23</b> Qual Prep	<b>24</b> Qual Prep	<b>25</b> Qual Prep	<b>26</b> Qual Prep
	<b>29</b> Qual I	<b>30</b> Qual I	<b>31</b> Qual I	<b>1</b> Qual I	<b>2</b> Qual I
<b>Feb 2018</b>	<b>5</b> Qual III	<b>6</b> Qual III	<b>7</b> Qual III	<b>8</b> Qual III	<b>9</b> Qual III
	<b>12</b> Qual IV	<b>13</b> Qual IV	<b>14</b> Qual IV	<b>15</b> Qual IV	<b>16</b> Qual IV
	<b>19</b> Qual Unknown	<b>20</b> Qual Unknown	<b>21</b> Qual Unknown	<b>22</b> Qual Unknown	<b>23</b> Qual Unknown
	<b>26</b> Qual Make-Up	<b>27</b> Qual Make-Up	<b>28</b> Lab #1	<b>1</b> Lab #1	<b>2</b> Lab #1
<b>Mar 2018</b>	<b>5</b> Spring Break	<b>6</b> Spring Break	<b>7</b> Spring Break	<b>8</b> Spring Break	<b>9</b> Spring Break
	<b>12</b> Lab #1	<b>13</b> Lab #1	<b>14</b> Lab #2	<b>15</b> Lab #2	<b>16</b> Lab #2
	<b>19</b> Lab #2	<b>20</b> Lab #2	<b>21</b> Lab #3	<b>22</b> Lab #3	<b>23</b> Lab #3
	<b>26</b> Lab #3	<b>27</b> Lab #3	<b>28</b> No Lab	<b>29</b> Easter Break	<b>30</b> Easter Break
<b>Apr 2018</b>	<b>2</b> Easter Break	<b>3</b> No Lab	<b>4</b> Lab #4	<b>5</b> Lab #4	<b>6</b> Lab #4
	<b>9</b> Lab #4	<b>10</b> Lab #4	<b>11</b> Quiz #2	<b>12</b> Quiz #2	<b>13</b> Quiz #2
	<b>16</b> Quiz #2	<b>17</b> Quiz #2	<b>18</b> No Lab	<b>19</b> No Lab VL due by noon	<b>20</b> No Lab
	<b>23</b> Check Out	<b>24</b> Check Out	<b>25</b> Check Out	<b>26</b> Check Out	<b>27</b> Check Out