COVID-19 and the Effect On Grades

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Content

Abstract

The goal of the project was to determine if the academic and social circumstance of the COVID-19 pandemic affected grades at Georgia College and State University in any way. The data was collected from the GCSU Grade Distribution Database and the GCSU Merits website. The scope of the analysis was primarily focused on the most popular courses at GCSU from Spring of 2018 through Spring of 2021. The consequences of this project are not only topical but also immediately relevant to the procedures of academic learning in the face of a global pandemic. We can answer the question of if what was done would suffice if a future emergency were to occur that would warrant the need of at-a-distance and or hybridized learning. We compared grade distribution before and after the COVID breakout for different courses based on department, major, and level (1000, 2000, 3000, 4000). In this project, we have found that the Spring 2020 semester has multiple significant discrepancies, compared to other spring semesters.

Introduction

Here are some important historical differences to keep in mind:

Spring 2020: At Georgia College, and many other universities, half of this semester was business as usual. In mid to late march, half way through the semester, COVID-19 started spreading quickly around the United States, while we went on spring break. The public universities of Georgia decided to extend spring break another week so that they could prepare to have their very first fully online experience. Many professors had never used this technology and the last half of the semester was very difficult for learning and grading. Most professors did not know how to utilize their resources and prevent cheating.

Fall 2020: After the second half of spring 2020, and an entire summer semester, Georgia College had it's first first hybrid semester. Some classes were fully in person(with social distancing measures in place), hybridized(meet in class sometimes and online other times), or fully online.

Spring 2021: This semester was similar to Fall 2020, but most classes started weaning back to fully in person.

The data analyzed came from Georgia College's Grade Distribution Database, and the GCmerit website listed here; https://gcsu.meritpages.com/

The scope of the analysis was primarily focused on the most popular undergraduate courses at GCSU from spring of 2018 through spring of 2021. Since Georgia College has approximately 7000 students, popular classes were categorized as those who gave several hundred grades a semester. The classes tracked are the subject abbreviations below.

```
##  [1] "MATH" "PHYS" "CHEM" "BIOL" "PSYC" "MUSC" "PHIL" "NRSG" "ACCT" "ECON"
## [11] "CSCI" "BCOM" "ENGL" "GC1Y" "GC2Y" "KINS" "HIST" "MGMT" "MKTG"
```

Among these classes, we observed the percentage of A, WI, DF, and ABC grades given. The compound variables WI, DF, and ABC are defined as:

$$WI = W + I$$

$$DF = D + F$$

$$ABC = A + B + C$$

Where A is the percentage of A grades given, B, C, D, and F are likewise. The W and I variables are the percentage of withdrawals and incomplete grades respectively.

After the general analysis, we analyzed the grade variables above in different levels to see if there was any significant difference.The levels were LL, UL, STEM, LA, BC, MC. These are defined as lower level, upper level, STEM classes, Liberal Arts classes, Business Classes, and Medical Classes respectively. More specifically;

$$LL = 1000 Level + 2000 Level$$

$$UL = 3000 Level + 4000 Level$$

$$STEM = PHYS + MATH + CHEM + CSCI$$

$$LA = HIST + ENGL + PSYC + MUSC + PHIL$$

$$BC = ECON + MGMT + MKTG + BCOM + ACCT$$

$$MC = BIOL + KINS + NRSG$$

Though they share many classes, the spring and fall semesters have too many differences to be compared fairly. Therefore in all the analysis, each spring term was compared only to other spring terms. Likewise for fall. All significance test were performed at the 5% significance level.

Analysis of A grades

In the overall distribution of grades from the classes observed, we found a significant increase in A's from spring semesters before the pandemic to the spring 2020 semester.

Spring A

```
##               Df Sum Sq Mean Sq F value  Pr(>F)
## ind            2   3982  1991.1   5.621 0.00414 **
## Residuals    228  80769   354.3
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
## 225 observations deleted due to missingness

##   Tukey multiple comparisons of means
##     95% family-wise confidence level
##
## Fit: aov(formula = values ~ ind, data = cgroups)
##
## $ind
##                 diff         lwr       upr      p adj
## A20-A1819   9.663913   2.5129314 16.814895 0.0046353
## A21-A1819   6.203568  -0.9474134 13.354550 0.1035838
## A21-A20    -3.460345 -11.7056461  4.784956 0.5838882


##      A1819             A20               A21
##  Min.   : 8.80   Min.   :18.40   Min.   : 11.00
##  1st Qu.:31.95   1st Qu.:41.42   1st Qu.: 40.80
##  Median :46.80   Median :60.30   Median : 56.10
##  Mean   :46.59   Mean   :56.25   Mean   : 52.79
##  3rd Qu.:59.75   3rd Qu.:68.95   3rd Qu.: 65.80
##  Max.   :84.90   Max.   :95.90   Max.   :100.00
##  NA's   :37      NA's   :94      NA's   :94
```

%A in Spring 2018

%A in Spring 2019

%A in Spring 2020
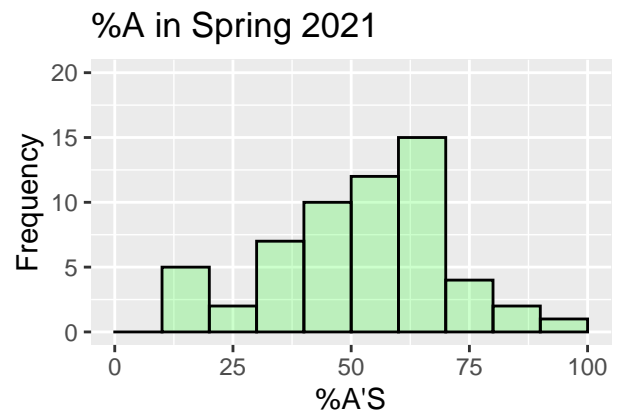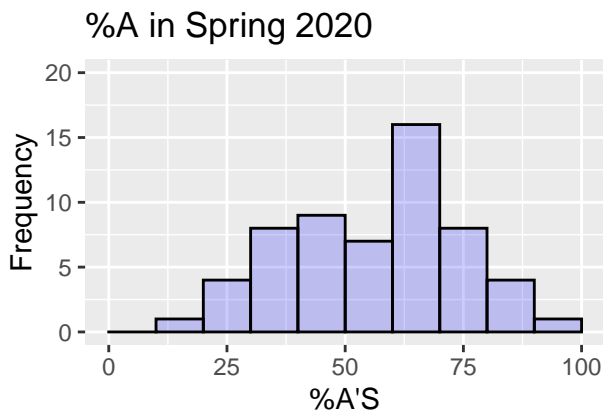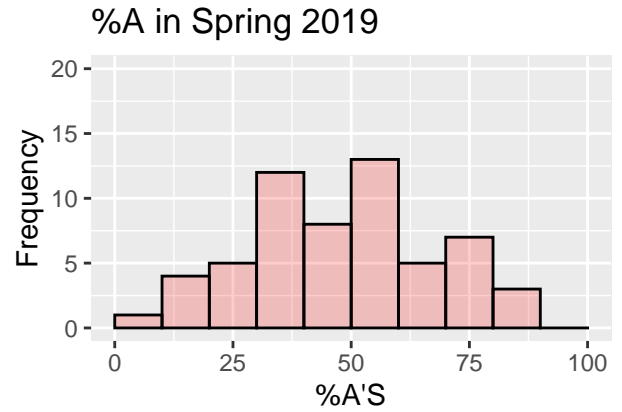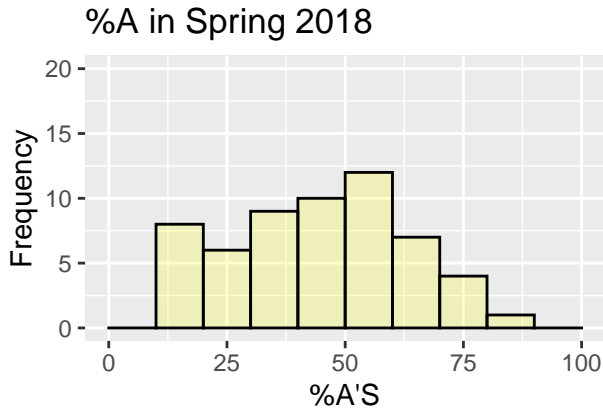
%A in Spring 2021

Observe the almost 10% increase in percentage of A grades given in 2020 as compared to the averaged 2018 and 2019. This shows there were significantly more A grades given in spring 2020 as compared to before the pandemic, with the percentage of A's comming back down a little in Spring 2021. Though it was still above 50%.

LL Spring A

```
##             Df Sum Sq Mean Sq F value Pr(>F)
## ind          2   2587  1293.6   3.836 0.0248 *
## Residuals  100  33721   337.2
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
## 125 observations deleted due to missingness

##   Tukey multiple comparisons of means
##     95% family-wise confidence level
##
## Fit: aov(formula = values ~ ind, data = cgroups)
##
## $ind
##                diff        lwr       upr     p adj
## A20-A1819 12.109201   1.581311 22.637090 0.0199372
## A21-A1819  5.874585  -4.653304 16.402475 0.3833287
## A21-A20   -6.234615 -18.351641  5.882411 0.4418070

##    A1819            A20             A21
##  Min.   :14.50   Min.   :23.80   Min.   :16.60
##  1st Qu.:34.10   1st Qu.:45.30   1st Qu.:40.80
##  Median :48.40   Median :62.30   Median :55.55
##  Mean   :46.62   Mean   :58.73   Mean   :52.50
##  3rd Qu.:59.60   3rd Qu.:68.95   3rd Qu.:65.20
##  Max.   :84.90   Max.   :95.90   Max.   :85.70
##  NA's   :25      NA's   :50      NA's   :50
```
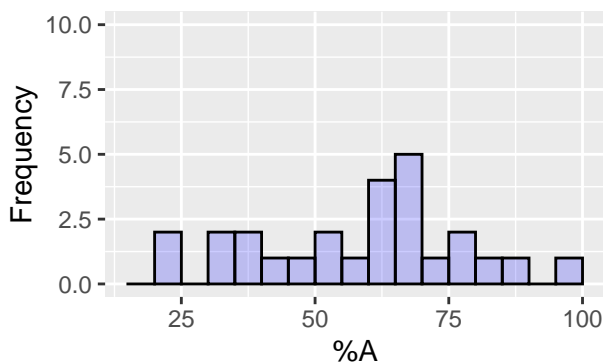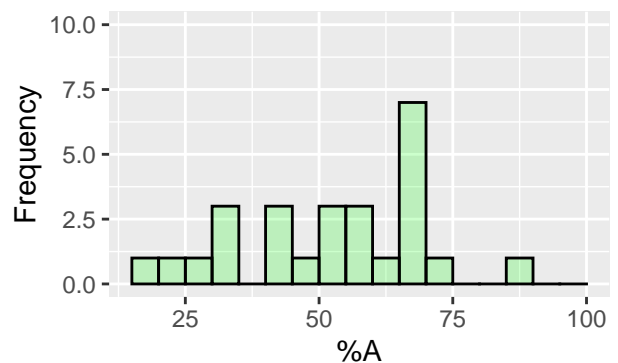

%A LL in Spring 2018
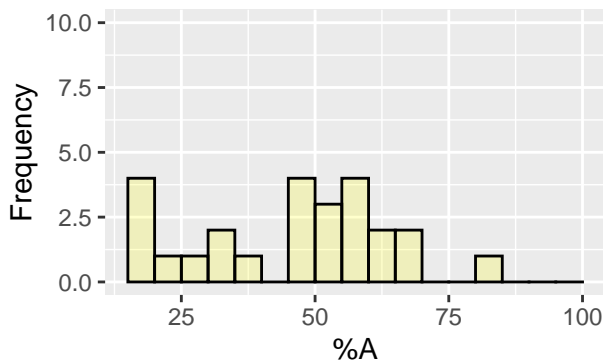
%A LL in Spring 2019
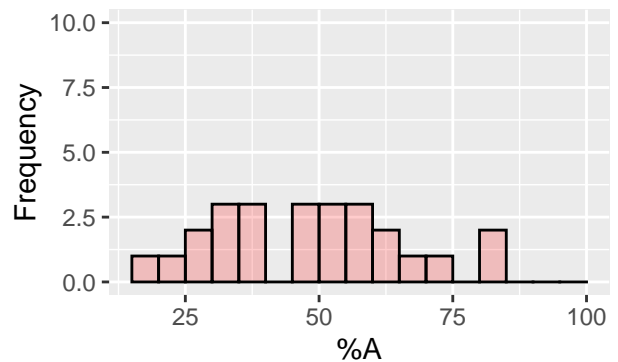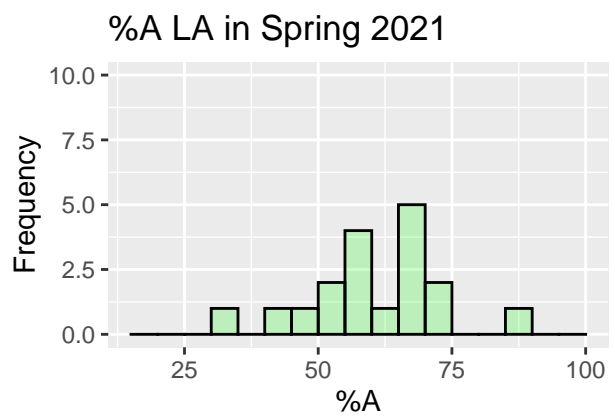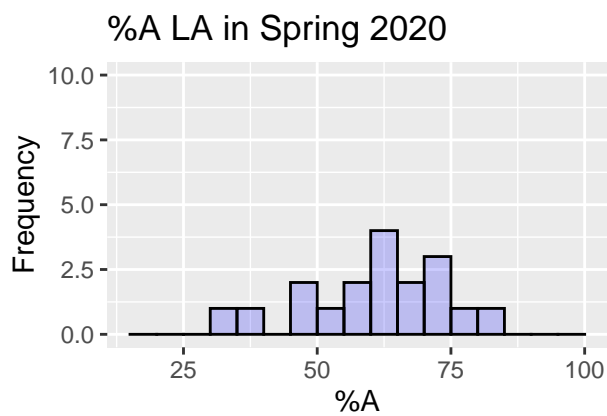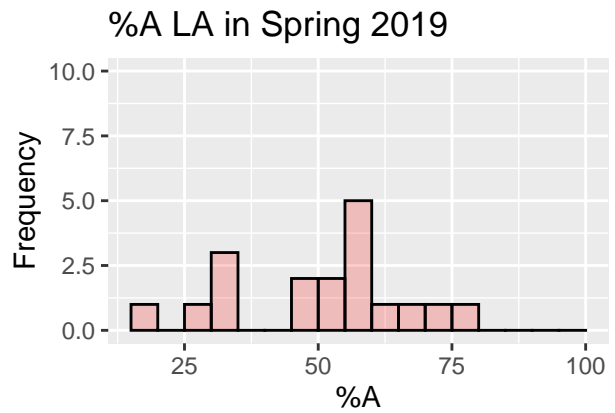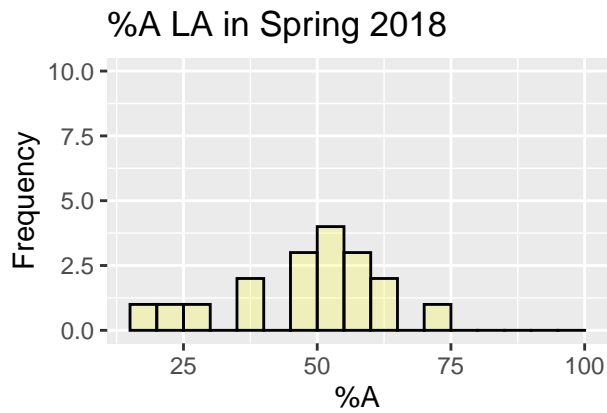

%A LL in Spring 2020

%A LL in Spring 2021

The percentage of A grades before the pandemic in the lower level course is almost identical to the overall percentage of A's in that time, but notice the more than 12% difference between then and spring 2020.

LA Spring A

```
##             Df Sum Sq Mean Sq F value  Pr(>F)
## ind          2   2776  1387.8   7.206 0.00144 **
## Residuals   69  13289   192.6
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
## 48 observations deleted due to missingness


##   Tukey multiple comparisons of means
##     95% family-wise confidence level
##
## Fit: aov(formula = values ~ ind, data = cgroups)
##
## $ind
##                 diff        lwr      upr     p adj
## A20-A1819 12.5388889   2.942945 22.13483 0.0071445
## A21-A1819 12.2944444   2.698500 21.89039 0.0085197
## A21-A20   -0.2444444 -11.324886 10.83600 0.9984617


##      A1819              A20               A21
##  Min.   :19.20   Min.   :31.00   Min.   :33.30
##  1st Qu.:37.10   1st Qu.:54.27   1st Qu.:53.30
##  Median :52.15   Median :61.25   Median :61.70
##  Mean   :48.52   Mean   :61.06   Mean   :60.81
##  3rd Qu.:57.10   3rd Qu.:72.40   3rd Qu.:67.88
##  Max.   :75.00   Max.   :82.40   Max.   :87.50
##  NA's   :4       NA's   :22      NA's   :22
```

%A LA in Spring 2018

%A LA in Spring 2019

%A LA in Spring 2020

%A LA in Spring 2021

Yet again, the pre-COVID-19 average percentage of A's is similar to the overall percentage at that time. Though in the Liberal Arts classes, there was also about a 12% increase in percentage of A's given in spring 2020, and it did not really go back down in spring 2021. It was still above 60%. It is worth mentioning that the LA classes are comprised of PHIL, ENGL, and HIST. These are heavy paper based classes that could continue COVID procedures easily. MUSC on the other hand is a very in-person based curriculum.Also I would like to note that PHIL and MUSC had the highest averages of all classes observed.

Analysis of DF grades

We found that in almost every subset we made of the overall data, there were significantly less DF grades given in spring 2020, compared to the previous spring semesters. Here is the overall distribution.

Spring DF

```
##               Df Sum Sq Mean Sq F value   Pr(>F)
## ind            2    591  295.58   15.88 3.48e-07 ***
## Residuals    228   4243   18.61
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
## 225 observations deleted due to missingness

##   Tukey multiple comparisons of means
##     95% family-wise confidence level
##
## Fit: aov(formula = values ~ ind, data = cgroups)
##
## $ind
##                   diff        lwr        upr     p adj
## DF20-DF1819 -3.8878411 -5.526765 -2.2489174 0.0000002
## DF21-DF1819 -0.8637031 -2.502627  0.7752205 0.4290067
## DF21-DF20    3.0241379  1.134409  4.9138672 0.0005955

##      DF1819             DF20             DF21
##  Min.   : 0.00   Min.   :0.000   Min.   : 0.000
##  1st Qu.: 2.30   1st Qu.:0.550   1st Qu.: 1.675
##  Median : 4.90   Median :1.600   Median : 4.450
##  Mean   : 5.89   Mean   :2.002   Mean   : 5.026
##  3rd Qu.: 7.75   3rd Qu.:3.100   3rd Qu.: 7.750
##  Max.   :25.70   Max.   :7.400   Max.   :20.000
##  NA's   :37      NA's   :94      NA's   :94
```

%DF in Spring 2018

%DF in Spring 2019

%DF in Spring 2020
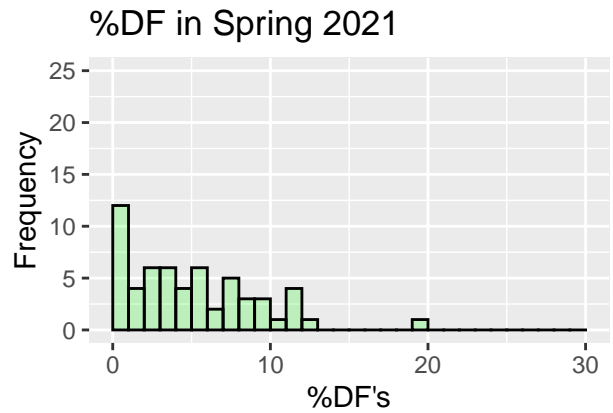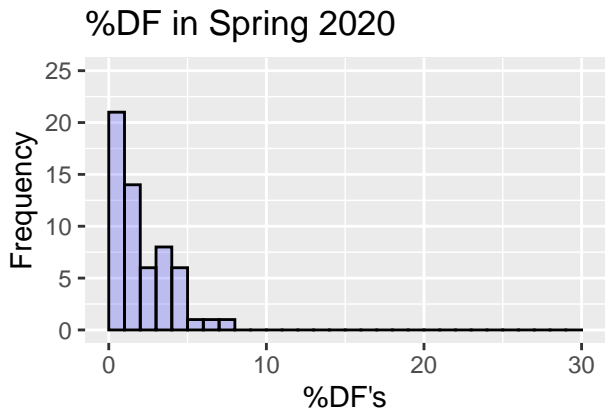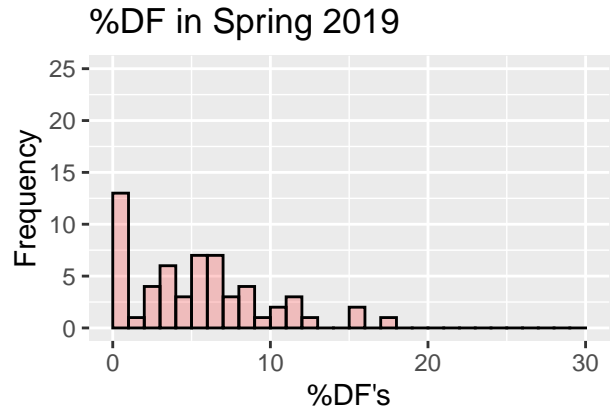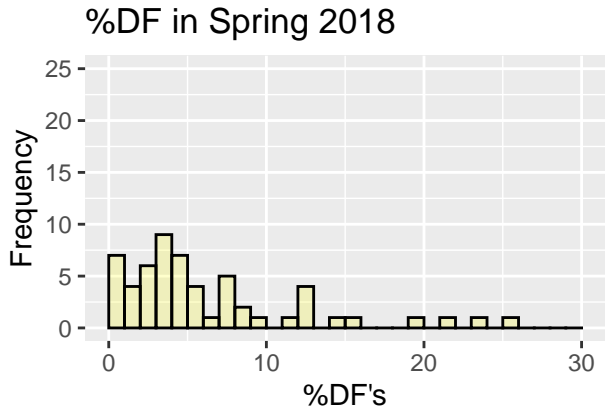
%DF in Spring 2021

Note the previous spring semesters averaged about 6% DF grades, while spring 2020 had 2% DF grades. Then in spring 2021, it goes back to seemingly normal at 5%. This change was contributed to by the lower level, upper level, STEM, LA, and BC courses.
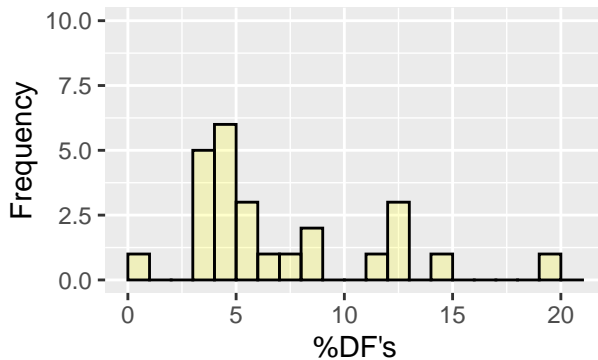
LL Spring DF

```
##               Df Sum Sq Mean Sq F value   Pr(>F)
## ind            2  351.7  175.85   13.57 6.09e-06 ***
## Residuals    100 1295.5   12.95
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
## 125 observations deleted due to missingness

##    Tukey multiple comparisons of means
##      95% family-wise confidence level
##
## Fit: aov(formula = values ~ ind, data = cgroups)
##
## $ind
##                   diff       lwr       upr     p adj
## DF20-DF1819 -4.3953997 -6.458896 -2.331903 0.0000055
## DF21-DF1819 -0.4953997 -2.558896  1.568097 0.8357579
## DF21-DF20    3.9000000  1.525029  6.274971 0.0004959

##      DF1819            DF20             DF21
##  Min.   : 0.000   Min.   :0.000   Min.   : 0.000
##  1st Qu.: 3.850   1st Qu.:1.150   1st Qu.: 3.925
##  Median : 5.500   Median :2.000   Median : 6.200
##  Mean   : 6.661   Mean   :2.265   Mean   : 6.165
##  3rd Qu.: 8.800   3rd Qu.:3.325   3rd Qu.: 8.300
##  Max.   :19.100   Max.   :6.700   Max.   :11.900
##  NA's   :25       NA's   :50      NA's   :50
```
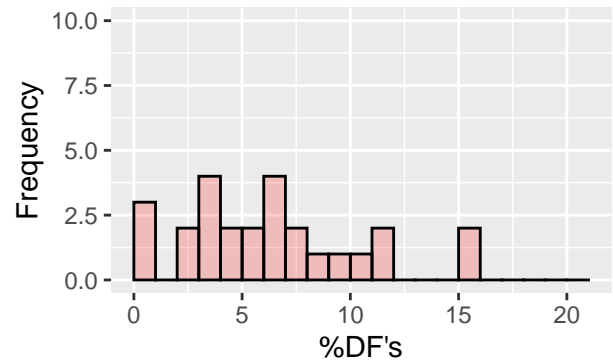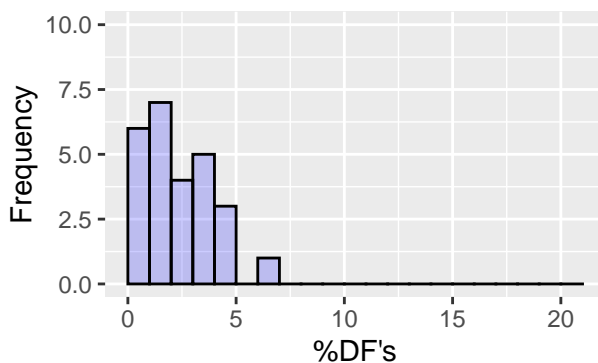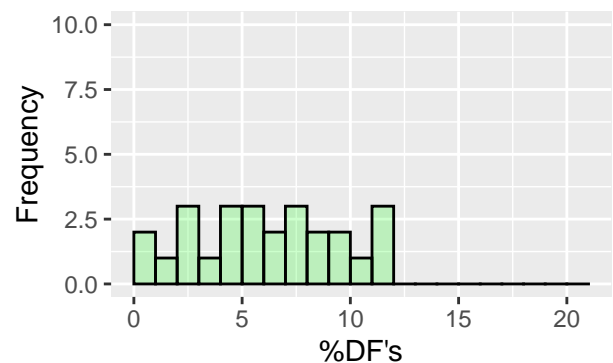

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Here in the LL courses, before and after spring 2020, the percentage of DF grades stays around 6%, but spring 2020 its a little more than 2%.
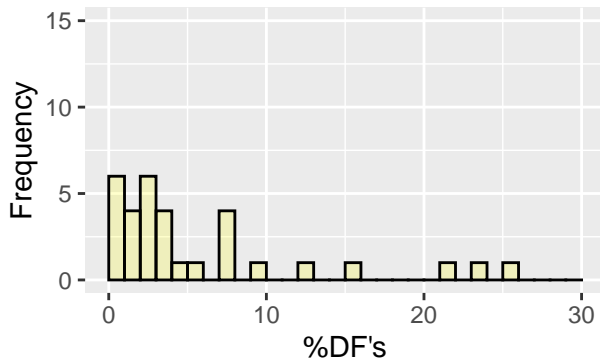
UL Spring DF

```
##            Df Sum Sq Mean Sq F value  Pr(>F)
## ind         2  259.5  129.74   5.734 0.00414 **
## Residuals 125 2828.1   22.63
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
## 100 observations deleted due to missingness

##   Tukey multiple comparisons of means
##     95% family-wise confidence level
##
## Fit: aov(formula = values ~ ind, data = cgroups)
##
## $ind
##                diff        lwr       upr     p adj
## DF20-DF1819 -3.4875 -5.9302149 -1.044785 0.0027066
## DF21-DF1819 -1.1750 -3.6177149  1.267715 0.4908081
## DF21-DF20    2.3125 -0.5081042  5.133104 0.1305671

##     DF1819             DF20              DF21
## Min.   : 0.000   Min.   :0.000    Min.   : 0.000
## 1st Qu.: 1.050   1st Qu.:0.000    1st Qu.: 0.300
## Median : 3.800   Median :1.150    Median : 3.100
## Mean   : 5.275   Mean   :1.788    Mean   : 4.100
## 3rd Qu.: 7.225   3rd Qu.:2.650    3rd Qu.: 5.725
## Max.   :25.700   Max.   :7.400    Max.   :20.000
## NA's   :12       NA's   :44       NA's   :44
```
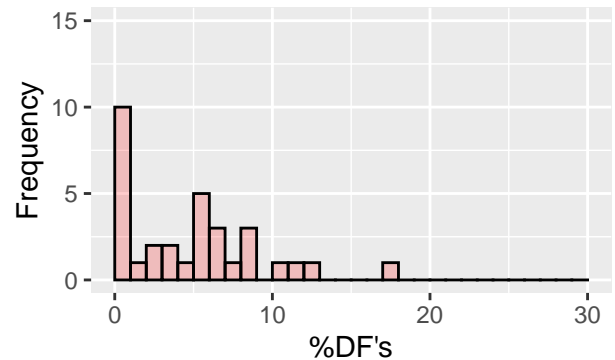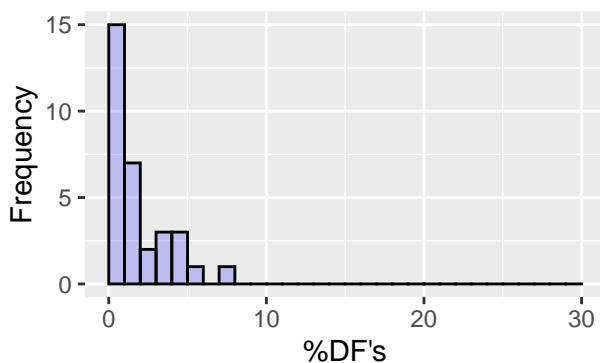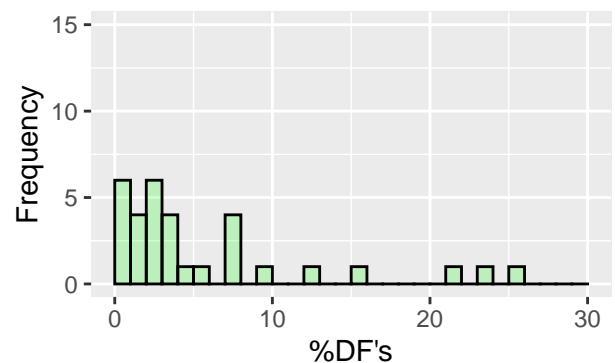

%DF UL in Spring 2018

%DF UL in Spring 2019

%DF UL in Spring 2020

%DF UL in Spring 2021

In the UL courses, the trend is similar. Before spring 2020, the DF grade percentage is around 5%, while in spring 2020 the percentage drops to almost 2%.
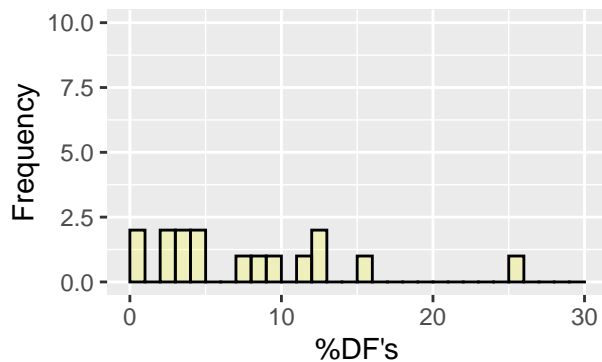
STEM Spring DF

```
##              Df Sum Sq Mean Sq F value  Pr(>F)
## ind           2  300.7  150.37   7.654 0.00108 **
## Residuals    61 1198.4   19.65
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
## 32 observations deleted due to missingness

##   Tukey multiple comparisons of means
##     95% family-wise confidence level
##
## Fit: aov(formula = values ~ ind, data = cgroups)
##
## $ind
##                  diff       lwr        upr      p adj
## DF20-DF1819 -5.178125 -8.438186 -1.918064 0.0009212
## DF21-DF1819 -2.834375 -6.094436  0.425686 0.1006410
## DF21-DF20    2.343750 -1.420644  6.108144 0.3001076

##    DF1819             DF20              DF21
## Min.   : 0.000   Min.   :0.000   Min.   : 0.000
## 1st Qu.: 3.875   1st Qu.:0.000   1st Qu.: 1.050
## Median : 7.000   Median :1.400   Median : 3.750
## Mean   : 7.297   Mean   :2.119   Mean   : 4.463
## 3rd Qu.:10.425   3rd Qu.:3.575   3rd Qu.: 6.700
## Max.   :25.700   Max.   :7.400   Max.   :12.000
##                  NA's   :16      NA's   :16
```
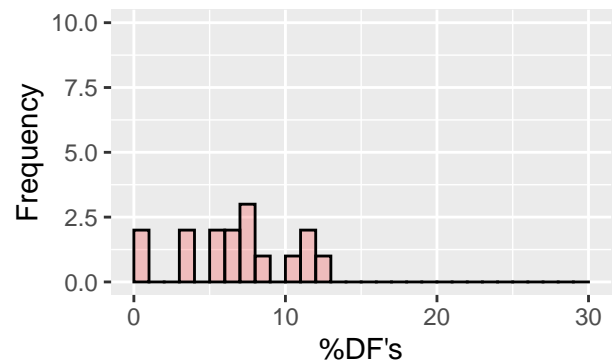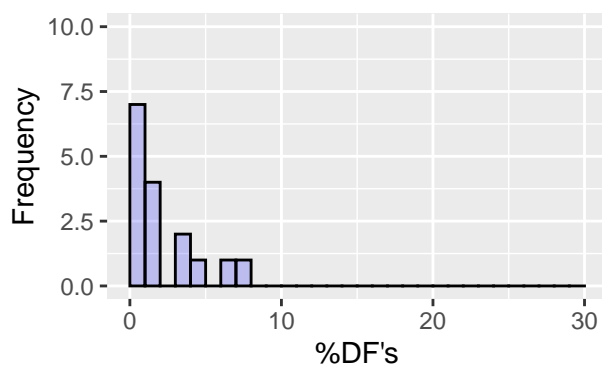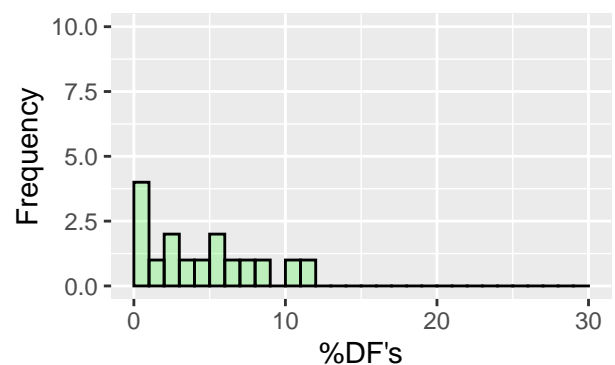

%DF STEM in Spring 2018

%DF STEM in Spring 2019

%DF STEM in Spring 2020

%DF STEM in Spring 2021

Once again, the trend is similar. STEM spring DF grades were averaged about 7% before COVID-19, but in spring 2020, it dropped to about 2%.

STEM Fall DF

```
##             Df Sum Sq Mean Sq F value Pr(>F)
## ind          1  148.8  148.75   4.299 0.0438 *
## Residuals   46 1591.8   34.61
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
## 16 observations deleted due to missingness

##   Tukey multiple comparisons of means
##     95% family-wise confidence level
##
## Fit: aov(formula = values ~ ind, data = cgroups)
##
## $ind
##                 diff       lwr      upr     p adj
## DF20-DF1819 3.734375 0.108786 7.359964 0.0437727

##     DF1819             DF20
##  Min.   : 0.000   Min.   : 0.000
##  1st Qu.: 3.050   1st Qu.: 4.475
##  Median : 6.350   Median : 8.500
##  Mean   : 6.084   Mean   : 9.819
##  3rd Qu.: 9.025   3rd Qu.:12.125
##  Max.   :16.200   Max.   :27.800
##                   NA's   :16
```
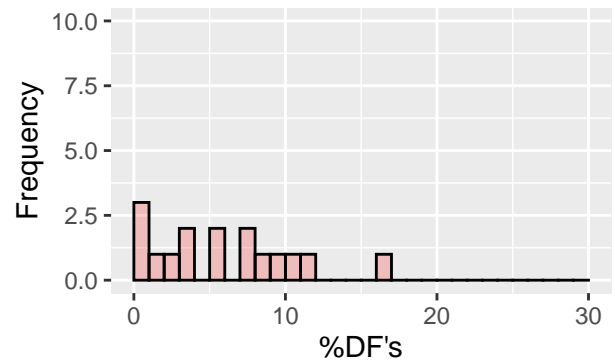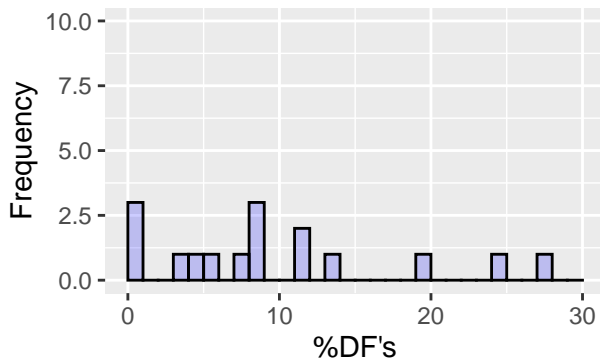

%DF STEM in Fall 2018
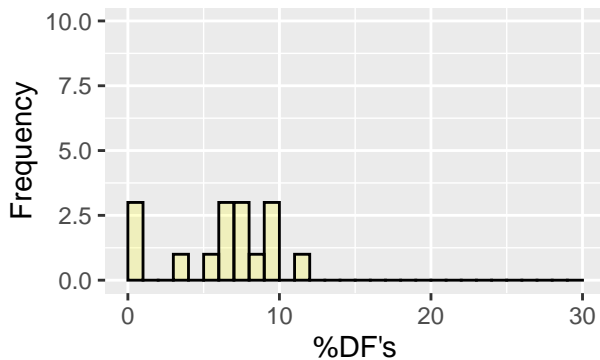
%DF STEM in Fall 2019

%DF STEM in Fall 2020

This was one of only two significant fall semester results. In the fall semester before COVID-19, there was an average STEM DF grade percentage of about 6%. Strangely enough, in fall of 2020, it went up to

about 10%. One reason this may be so is that undergraduate students at Georgia College are only allowed 5 withdrawal grades on their transcript(ones that do not count as a failure). We will see later in this paper that many students may have used some of their 5 withdrawals in spring 2020, so perhaps they felt like they could not spare another in fall 2020.
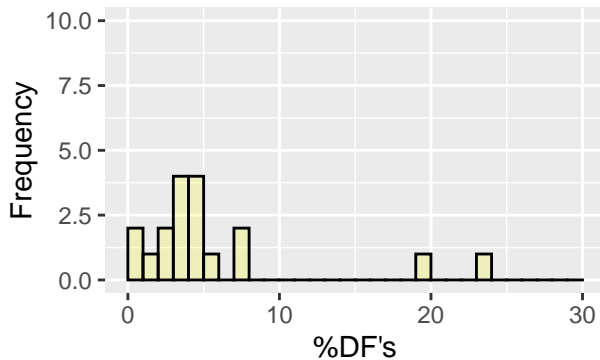
LA Spring DF

```
##             Df Sum Sq Mean Sq F value Pr(>F)
## ind         2  137.1   68.54   3.956 0.0236 *
## Residuals  69 1195.3   17.32
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
## 48 observations deleted due to missingness

##   Tukey multiple comparisons of means
##     95% family-wise confidence level
##
## Fit: aov(formula = values ~ ind, data = cgroups)
##
## $ind
##                  diff         lwr         upr      p adj
## DF20-DF1819 -3.094444 -5.97243660 -0.2164523 0.0321883
## DF21-DF1819  0.250000 -2.62799216  3.1279922 0.9764238
## DF21-DF20    3.344444  0.02122535  6.6676635 0.0482121

##     DF1819              DF20              DF21
##  Min.   : 0.000   Min.   :0.000   Min.   : 0.000
##  1st Qu.: 2.700   1st Qu.:1.000   1st Qu.: 1.850
##  Median : 4.550   Median :1.600   Median : 4.900
##  Mean   : 5.011   Mean   :1.917   Mean   : 5.261
##  3rd Qu.: 5.625   3rd Qu.:2.975   3rd Qu.: 7.400
##  Max.   :23.300   Max.   :4.700   Max.   :20.000
##  NA's   :4        NA's   :22      NA's   :22
```
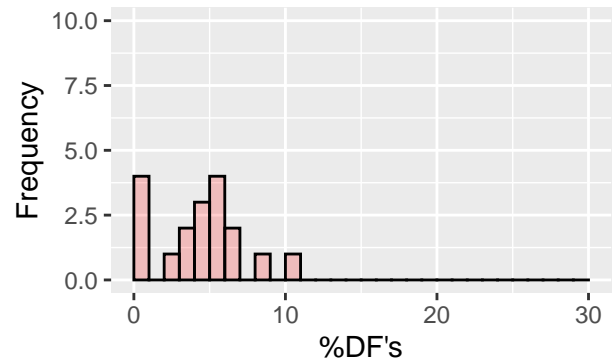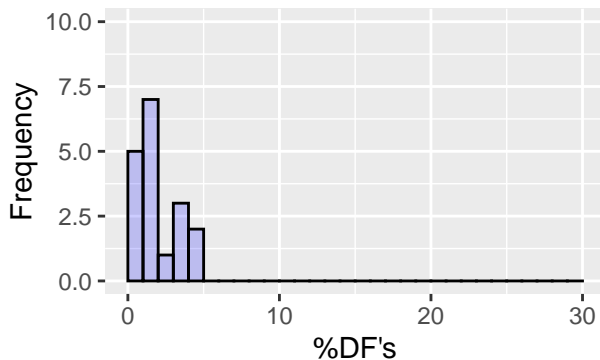

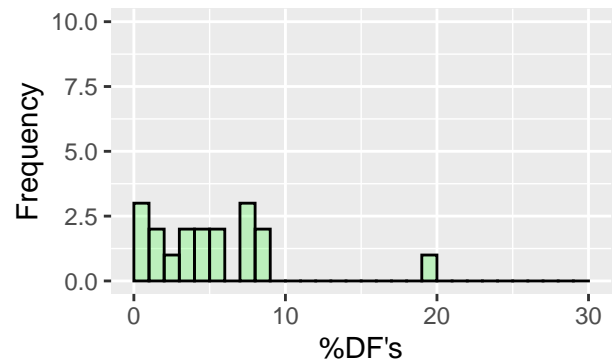
%DF LA in Spring 2018

%DF LA in Spring 2019

%DF LA in Spring 2020

%DF LA in Spring 2021

The Liberal Arts spring semesters also reflected a similar trend in their spring semesters. Before the pandemic, they averaged about 5% spring DF grades. Then in spring 2020, it drops to almost 2%. In spring 2021 it goes back up to about 5%.

LA Fall DF

```
##            Df Sum Sq Mean Sq F value Pr(>F)
## ind         1   46.9   46.94   5.752 0.0201 *
## Residuals  52  424.4    8.16
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
## 26 observations deleted due to missingness

##   Tukey multiple comparisons of means
##     95% family-wise confidence level
##
## Fit: aov(formula = values ~ ind, data = cgroups)
##
## $ind
##                 diff       lwr      upr      p adj
## DF20-DF1819 1.977778 0.3229429 3.632613 0.0200973

##     DF1819            DF20
##  Min.   :0.000   Min.   : 0.00
##  1st Qu.:2.525   1st Qu.: 3.40
##  Median :4.150   Median : 6.10
##  Mean   :4.072   Mean   : 6.05
##  3rd Qu.:5.275   3rd Qu.: 7.45
##  Max.   :9.600   Max.   :16.50
##  NA's   :4       NA's   :22
```
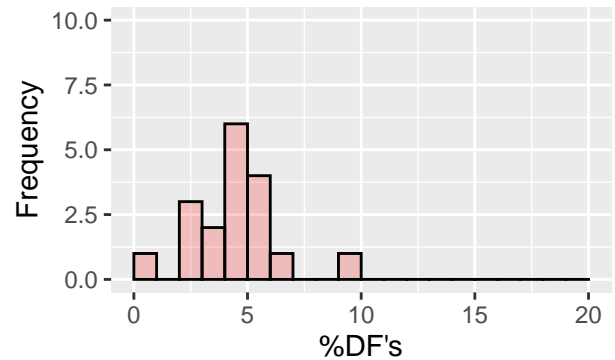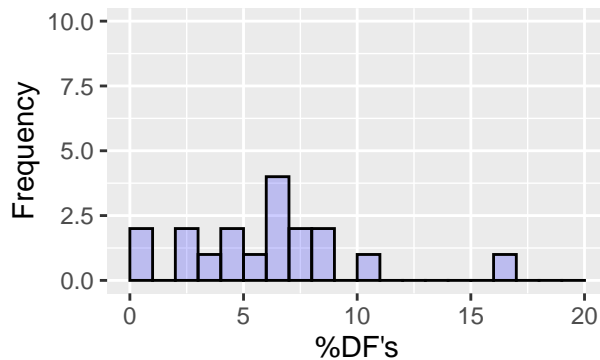
%DF LA in Fall 2018
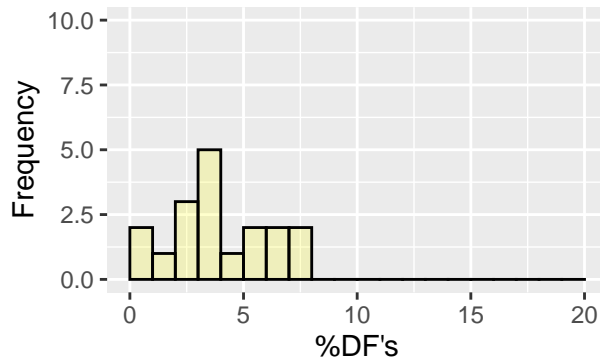
%DF LA in Fall 2019

%DF LA in Fall 2020

This is the second of only two significant fall semester results. Much like the STEM classes, the LA classes experienced and uptick in DF grades in fall of 2020 as compared to the previous fall semesters. From about 4% to about 6%, maybe for the same reasons.
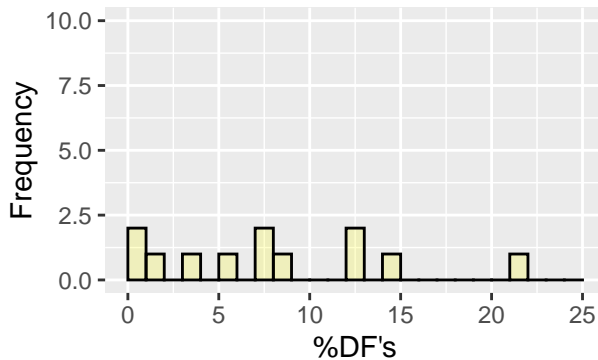
BC Spring DF

```
##             Df Sum Sq Mean Sq F value Pr(>F)
## ind          2  197.4   98.72   3.631 0.0345 *
## Residuals   45 1223.4   27.19
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
## 72 observations deleted due to missingness

##   Tukey multiple comparisons of means
##     95% family-wise confidence level
##
## Fit: aov(formula = values ~ ind, data = cgroups)
##
## $ind
##                  diff       lwr        upr     p adj
## DF20-DF1819 -4.958333 -9.426133 -0.4905335 0.0265203
## DF21-DF1819 -1.941667 -6.409466  2.5261331 0.5476711
## DF21-DF20    3.016667 -2.142304  8.1756375 0.3407612

##    DF1819             DF20              DF21
## Min.   : 0.000   Min.   :0.000   Min.   : 0.000
## 1st Qu.: 1.350   1st Qu.:0.600   1st Qu.: 2.050
## Median : 6.550   Median :2.350   Median : 4.200
## Mean   : 7.317   Mean   :2.358   Mean   : 5.375
## 3rd Qu.:12.450   3rd Qu.:4.050   3rd Qu.: 9.375
## Max.   :21.400   Max.   :5.800   Max.   :12.300
## NA's   :16       NA's   :28      NA's   :28
```
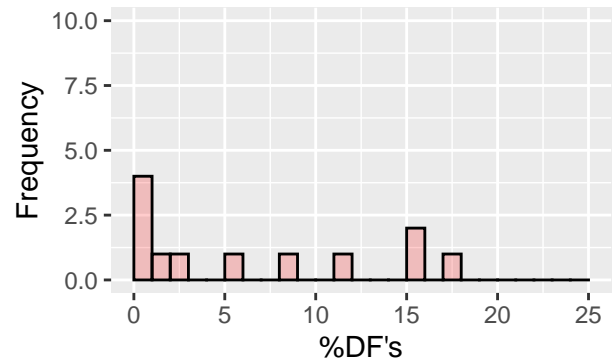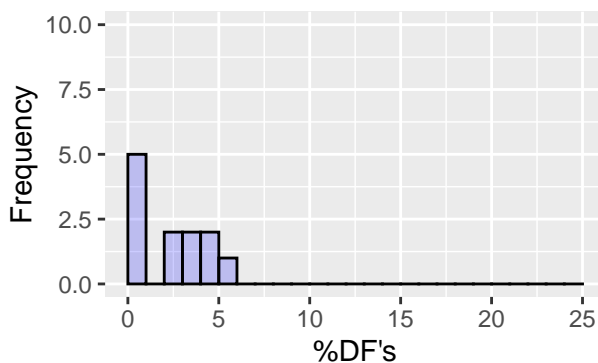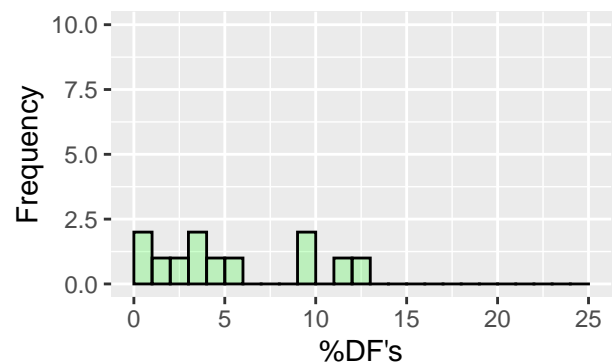

%DF BC in Spring 2018

%DF BC in Spring 2019

%DF BC in Spring 2020

%DF BC in Spring 2021

You can see here that the BC also had a substantial drop in spring DF grades from before 2020, to spring 2020. From about 7% to a similar 2% like the other subset classes.

MC Spring DF

```
##             Df Sum Sq Mean Sq F value Pr(>F)
## ind          2   62.5  31.232   3.356 0.0461 *
## Residuals   36  335.0   9.307
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
## 33 observations deleted due to missingness

##   Tukey multiple comparisons of means
##     95% family-wise confidence level
##
## Fit: aov(formula = values ~ ind, data = cgroups)
##
## $ind
##                  diff        lwr       upr     p adj
## DF20-DF1819 -2.371053 -5.28427507 0.5421698 0.1293849
## DF21-DF1819  1.038947 -1.87427507 3.9521698 0.6613487
## DF21-DF20    3.410000  0.07522571 6.7447743 0.0441513

##    DF1819           DF20            DF21
##  Min.   :0.000   Min.   :0.000   Min.   : 0.00
##  1st Qu.:1.250   1st Qu.:0.425   1st Qu.: 0.90
##  Median :2.500   Median :1.150   Median : 3.10
##  Mean   :3.621   Mean   :1.250   Mean   : 4.66
##  3rd Qu.:6.100   3rd Qu.:1.925   3rd Qu.: 7.45
##  Max.   :9.200   Max.   :3.100   Max.   :11.60
##  NA's   :5       NA's   :14      NA's   :14
```
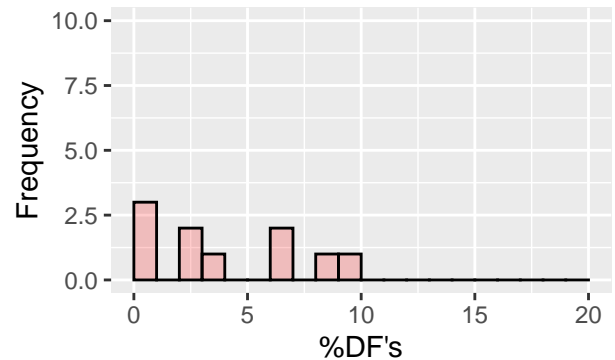

%DF MC in Spring 2018
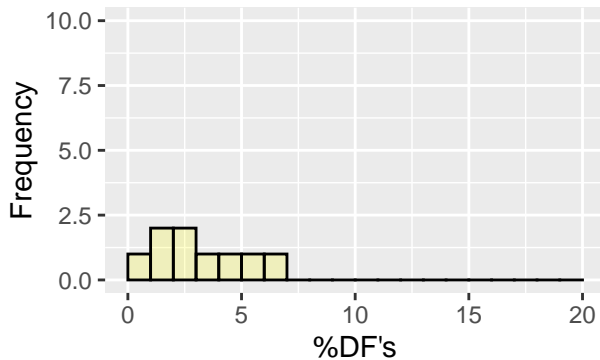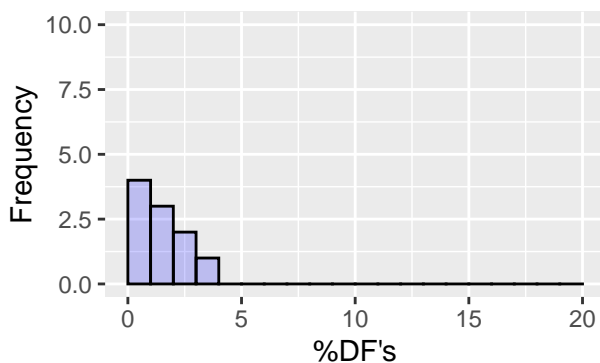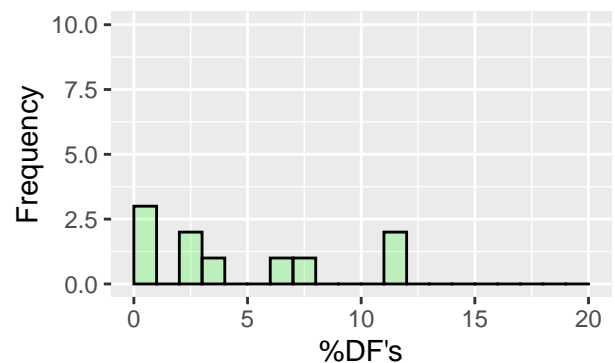

%DF MC in Spring 2019

%DF MC in Spring 2020

%DF MC in Spring 2021

The MC actually saw a very different result. Yes, spring 2020 was a little lower percentage of DF grades, but not significantly. The strange thing here is that in spring 2021, they experienced a spike in DF grades, which was substantially different from spring 2020, but only slightly higher than before the pandemic.

Analysis of WI grades

Overall, spring 2020 had significantly more WI grades than spring 2021.

Spring WI

```
##                Df Sum Sq Mean Sq F value Pr(>F)
## ind            2   98.2   49.09   3.864 0.0224 *
## Residuals    228 2897.0   12.71
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
## 225 observations deleted due to missingness


##   Tukey multiple comparisons of means
##     95% family-wise confidence level
##
## Fit: aov(formula = values ~ ind, data = cgroups)
##
## $ind
##                   diff        lwr        upr      p adj
## WI20-WI1819   1.2141319 -0.1401661  2.5684300 0.0890487
## WI21-WI1819  -0.5686267 -1.9229247  0.7856714 0.5835998
## WI21-WI20    -1.7827586 -3.3443058 -0.2212114 0.0206859


##      WI1819            WI20             WI21
##  Min.   : 0.000   Min.   : 0.000   Min.   : 0.000
##  1st Qu.: 1.900   1st Qu.: 2.125   1st Qu.: 1.225
##  Median : 3.800   Median : 5.000   Median : 2.800
##  Mean   : 4.231   Mean   : 5.445   Mean   : 3.662
##  3rd Qu.: 6.100   3rd Qu.: 7.300   3rd Qu.: 5.475
##  Max.   :13.500   Max.   :17.100   Max.   :19.000
##  NA's   :37       NA's   :94       NA's   :94
```

%WI in Spring 2018

%WI in Spring 2019

%WI in Spring 2020
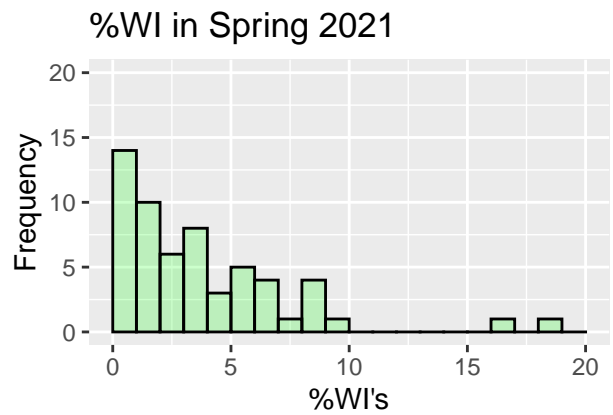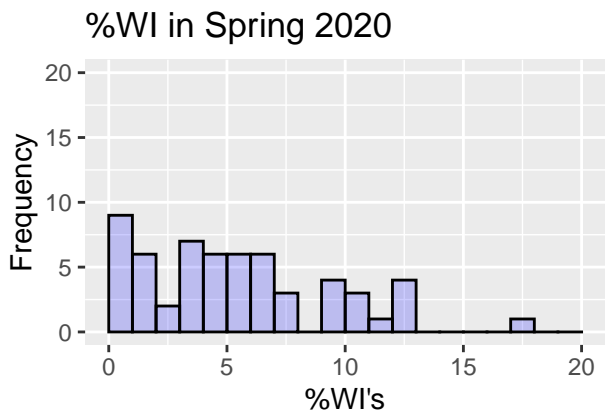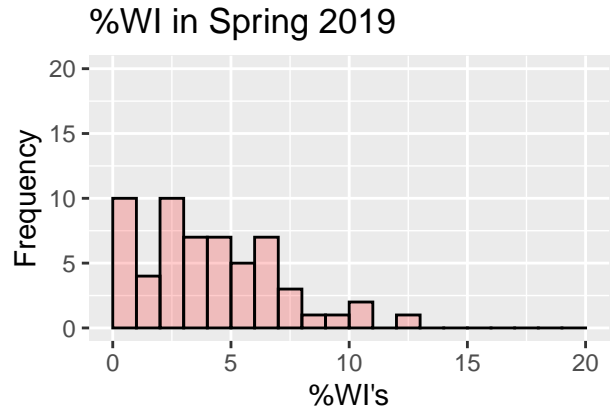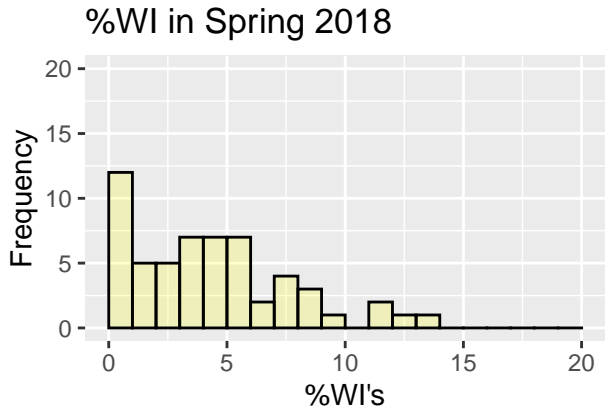
%WI in Spring 2021

In spring 2020, there were about 5.5% WI grades given. In spring 2021, it dropped to about 3.5%. This drop seems to have been influenced by the UL and LA courses.
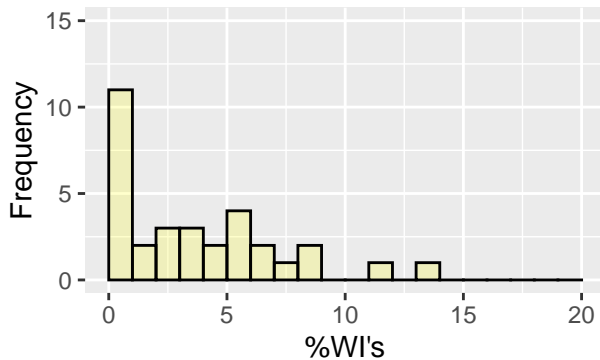
UL Spring WI

```
##               Df Sum Sq Mean Sq F value Pr(>F)
## ind           2   81.5   40.74   3.241 0.0424 *
## Residuals   125 1571.4   12.57
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
## 100 observations deleted due to missingness

##   Tukey multiple comparisons of means
##     95% family-wise confidence level
##
## Fit: aov(formula = values ~ ind, data = cgroups)
##
## $ind
##                  diff        lwr        upr      p adj
## WI20-WI1819   0.975000 -0.8458149  2.7958149 0.4146964
## WI21-WI1819  -1.271875 -3.0926899  0.5489399 0.2259920
## WI21-WI20    -2.246875 -4.3493709 -0.1443791 0.0331910

##    WI1819            WI20             WI21
## Min.   : 0.000   Min.   : 0.000   Min.   :0.000
## 1st Qu.: 0.500   1st Qu.: 1.550   1st Qu.:0.000
## Median : 3.050   Median : 3.700   Median :1.800
## Mean   : 3.728   Mean   : 4.703   Mean   :2.456
## 3rd Qu.: 5.775   3rd Qu.: 6.425   3rd Qu.:3.800
## Max.   :13.500   Max.   :17.100   Max.   :9.400
## NA's   :12       NA's   :44       NA's   :44
```
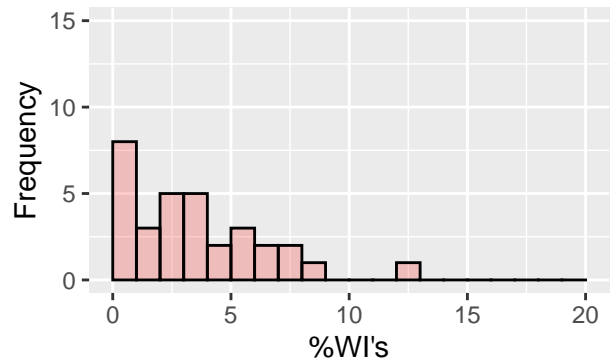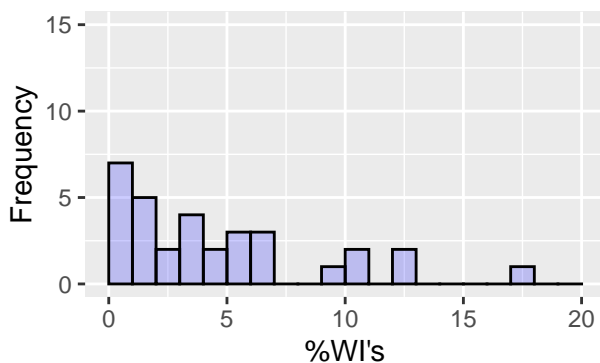

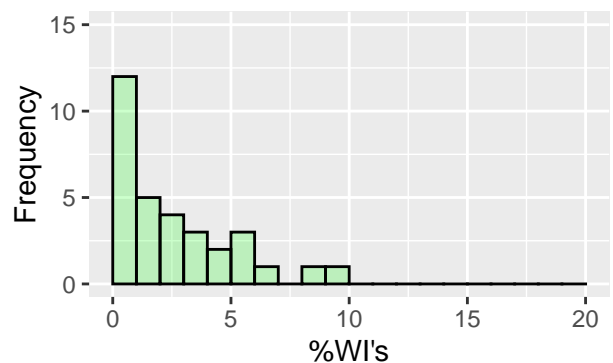%WI UL in Spring 2018

%WI UL in Spring 2019

%WI UL in Spring 2020

%WI UL in Spring 2021

In spring 2020, about 4.7% of UL grades were WI. In spring 2021, it dropped to about 2.5%.

LA Spring WI

```
##              Df Sum Sq Mean Sq F value Pr(>F)
## ind          2   57.3   28.67   3.865 0.0257 *
## Residuals   69  512.0    7.42
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
## 48 observations deleted due to missingness

##   Tukey multiple comparisons of means
##     95% family-wise confidence level
##
## Fit: aov(formula = values ~ ind, data = cgroups)
##
## $ind
##                   diff        lwr        upr     p adj
## WI20-WI1819   1.188889 -0.6946162  3.0723940 0.2916525
## WI21-WI1819  -1.333333 -3.2168385  0.5501718 0.2141430
## WI21-WI20    -2.522222 -4.6971066 -0.3473378 0.0190568

##     WI1819            WI20             WI21
##  Min.   : 0.000   Min.   : 0.000   Min.   :0.000
##  1st Qu.: 1.975   1st Qu.: 3.825   1st Qu.:1.275
##  Median : 3.100   Median : 4.550   Median :2.200
##  Mean   : 3.806   Mean   : 4.994   Mean   :2.472
##  3rd Qu.: 5.625   3rd Qu.: 5.975   3rd Qu.:3.475
##  Max.   :13.500   Max.   :10.500   Max.   :6.500
##  NA's   :4        NA's   :22       NA's   :22
```


%WI LA in Spring 2018
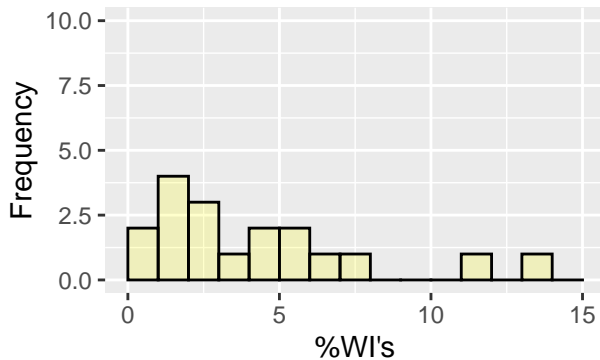
%WI LA in Spring 2019
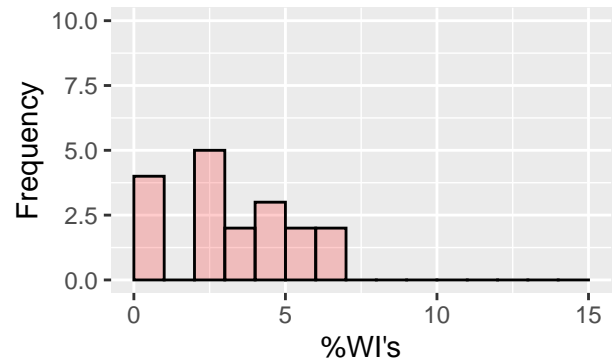
%WI LA in Spring 2020

%WI LA in Spring 2021

The LA classes show a similar trend to the UL classes above. In spring 2020, about 5% of LA grades were WI. In spring 2021, it dropped to about 2.5%.
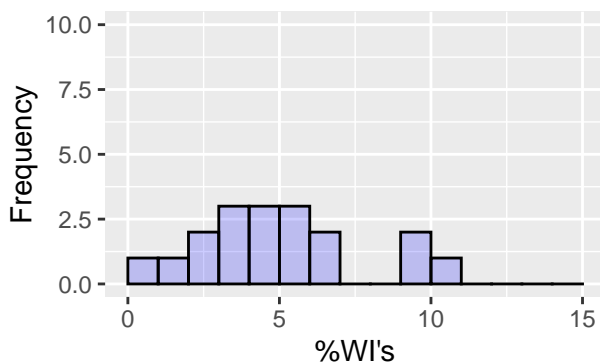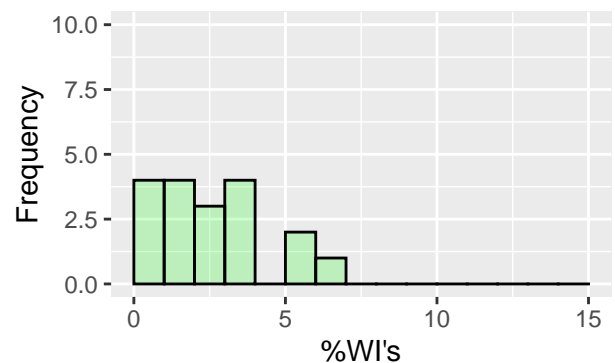
Merit Lists

Apart of the analysis included tracking how many students made the GC Dean's List and President's List. According to Georgia College's website, these list as defined as;

Dean's List: Students who make a term average of at least 3.5 on 12 or more semester hours at Georgia College are included on the Dean's List. Students may not have an "I" or "F" or "WF" during the semester.

President's List: Students who make a term average of 4.0 on 12 or more semester hours at Georgia College are included on the President's List. Students may not have a grade of "I" or "F" or "WF" during the semester.

Due to the frustrating design of the GCmerit website, the following data is an approximation of the total number of students who made the Dean's List and President's List from spring 2018, to spring 2021.

```
##           2018      2019      2020      2021
## Spring 1161-1170 1221-1230 1451-1460 1181-1190
## Fall   1341-1350 1361-1370 1131-1140 NA

##          2018     2019     2020      2021
## Spring 781-790 751-760 1161-1170 901-910
## Fall   741-750 771-780 831-840    NA
```

Here is the approximate difference between them.

```
##          18-19 18-20  18-21 19-20  19-21 20-21
## Spring +5%    +29.9% +1.7% +18.8% -3.3% -18.6%
## Fall   +1.5% -15.6% NA     -16.8% NA     NA

##          18-19 18-20  18-21  19-20  19-21  20-21
## Spring -3.8% +48.4% +15.3% +54.3% +19.9% -22.3%
## Fall   +4%    +12.1% NA     +7.7%  NA     NA
```

In both the Dean and President's lists, there is a substantial spike from spring 2018 to 2020, and spring 2019 to 2020. Also, notice that in both lists, a substantial decrease from spring 2020 to 2021, back down to a number similar to before spring 2020. The fall semesters do not reflect the same pattern.

Conclusions

The data really tells the story of COVID-19 in the Georgia College grade books. Professors and students were faced with a new obstacle and very little time to accommodate. As a result, professors either had to make assignments easier by making them open notes, or trusting in their students to not cheat. Some professors also likely felt that they could not punish student's grades for their lack of understanding online utilities or the events of the COVID-19 pandemic and it's effect on student abilities. Consequently, it would appear these factors lead to a decrease in failing grades in spring 2020. The data supports this conclusion across almost every subset of classes.

The data also suggest that in spring 2020, there was an increase in A grades, and consequently semester GPAs for many students. This result is supported by the increased percentage of A grades in the overall classes, lower level classes, and Liberal Arts classes. It may be that in lower level classes, professors felt more compassion on these students since they are mostly populated by first or second year students who are still new to college, let alone online procedures. The result is also supported by the spike in number of students who made the Dean and President's lists in spring 2020. It is worth noting that in fall 2020, STEM and LA classes saw an increase in DF grades, perhaps attributed to the limited withdrawal policy.

Even though there were no were results to say the number of WI grades significantly increased in spring 2020, the data shows that there was a significant decrease in these grades in spring 2021 compared to spring 2020. So they seemed to reflect a pattern of "high-low-high". Overall, it would appear that spring 2020 was a very different semester. But the student and faculty at Georgia College and State University appear to have made good adjustments post spring 2020 to accommodate online learning in a difficult time. In most subsets, the grade distributions in spring 2021 looked very similar to the spring semesters before hand. Also the fall 2020 saw almost no significant difference in comparison to the previous fall semesters.

References

- https://gcsu.meritpages.com/
- Georgia College and State University Grade Distribution Database, 2018-2021