

# SAS5 Repeated Measures

## Three ways to conduct Repeated Measure analysis in SAS:

1. Split-plot design
2. Multivariate repeated measures design using Proc GLM
3. Multivariate repeated measures design using Proc MIXED

## How you enter your data will depend on the type of analysis you choose:

1. Univariate format (columns) used in Split-plot and Proc MIXED

Eg.

Obs	Subj	AGEGRP	SEX	smoking	day
1	3	25-34 yrs	Female	8	1
2	3	25-34 yrs	Female	8	2
3	3	25-34 yrs	Female	8	3
4	3	25-34 yrs	Female	8	4
5	3	25-34 yrs	Female	8	5

2. Multivariate format (rows) for Multivariate analysis using Proc GLM

Eg.

Obs	Subj	AGEGRP	SEX	day1	day2	day3	day4	day5
1	3	25-34yrs	F	8	8	8	8	8
2	40	15-19yrs	F	10	10	10	10	10
3	117	45 yrs+	M	20	20	18	20	24

## SAS Data step coding to create a Univariate form of your dataset from a Multivariate form:

### Data

```
ctums2007_mult (keep = Subject AGEGRP5 SEX
DVMARST Day1 Day2 Day3 Day4 Day5 Day6 Day7
HP_Q010 MU_Q10)
ctums2007_univ (keep = Subject AGEGRP5 SEX
DVMARST day smoking);
```

```
set libname.ctums2007;
output ctums2007_mult;
```

```
smoking = Day1; day = 1; output ctums2007_univ;
smoking = Day2; day = 2; output ctums2007_univ;
smoking = Day3; day = 3; output ctums2007_univ;
smoking = Day4; day = 4; output ctums2007_univ;
smoking = Day5; day = 5; output ctums2007_univ;
smoking = Day6; day = 6; output ctums2007_univ;
smoking = Day7; day = 7; output ctums2007_univ;
Run;
```

## Repeated Measures Analysis sample coding:

### 1. Split-plot design

```
Proc glm data=ctums2007_univ;
class sex day subject;
model smoking = sex subject(sex) day sex*day;
test h=sex e=subject(sex);
Run;
```

### 2. Multivariate repeated measures design using Proc GLM

```
Proc glm data=ctums2007_mult;
class sex;
model day1-day7 = sex / nouni;
repeated time polynomial / printe summary;
lsmeans sex / pdiff cl adjust=tukey;
Run;
```

### 3. Multivariate repeated measures design using Proc MIXED

```
Proc mixed data=ctums2007_univ;
class sex day subject;
model smoking = sex day sex*day;
repeated day / type=cs subject=subject r;
lsmeans sex / pdiff cl adjust=tukey;
Run;
```